diesel power

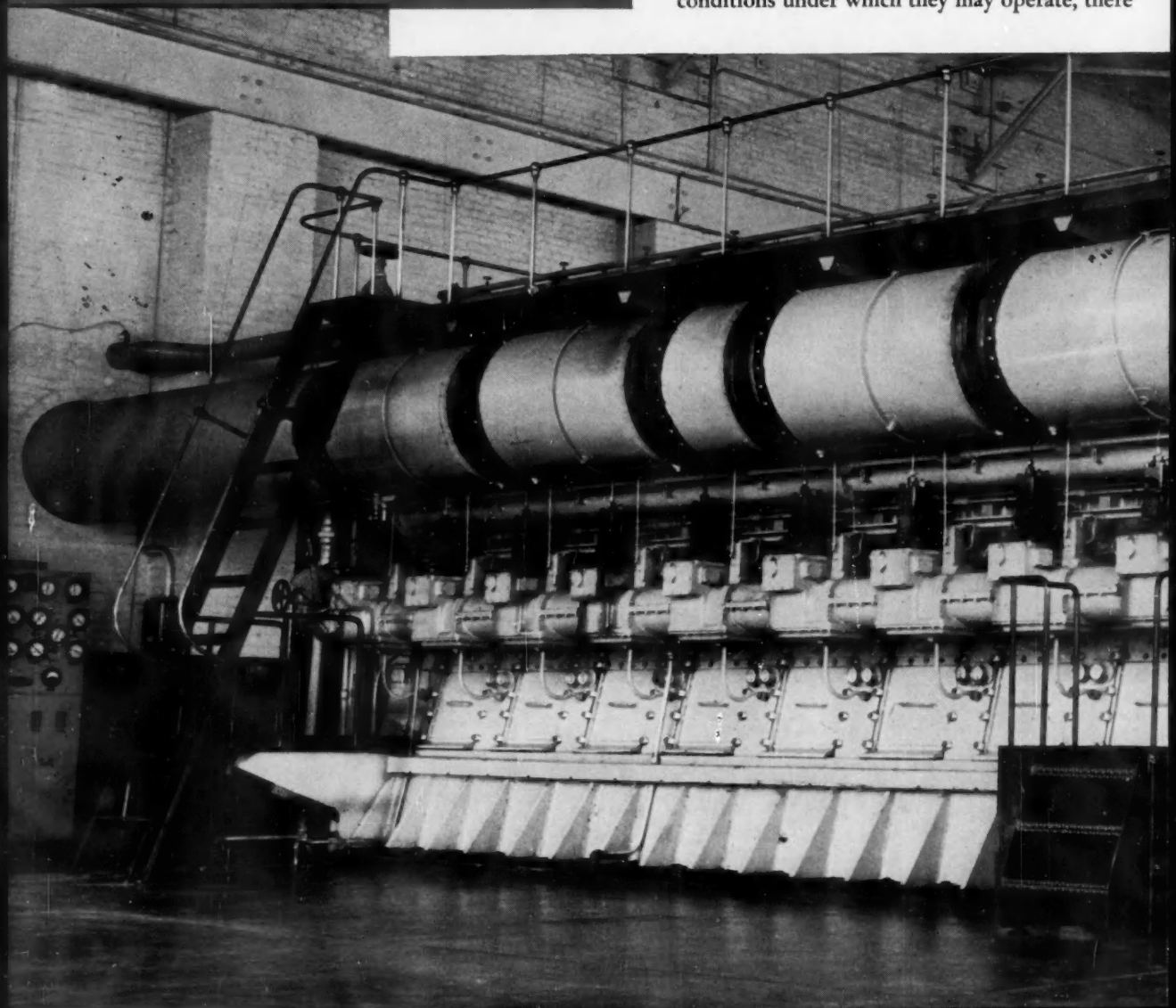
August 1955

Better Power Transmission With Fluid Drive

KEEP ALL RINGS FREE...

No engine can run its best when rings are "half slave, half free." To keep *all* rings free, *all* the time, lubricate with one of the famous *Texaco Ursa Oils*. You'll benefit from the resulting full power performance, low maintenance costs and low fuel consumption.

To meet the requirements of different engines—diesel, gas and dual-fuel—and the range of conditions under which they may operate, there



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STAR THEATER
starring
JIMMY DURANTE
or DONALD O'CONNOR
on television...
Saturday nights, NBC.

TEXACO

TEXACO
REG. T.M.

is a complete line of *Texaco Ursa Oils*. Each is especially refined and processed for its particular job. All have in common a high ability to resist oxidation, to keep engines clean and free from harmful deposits, to minimize wear.

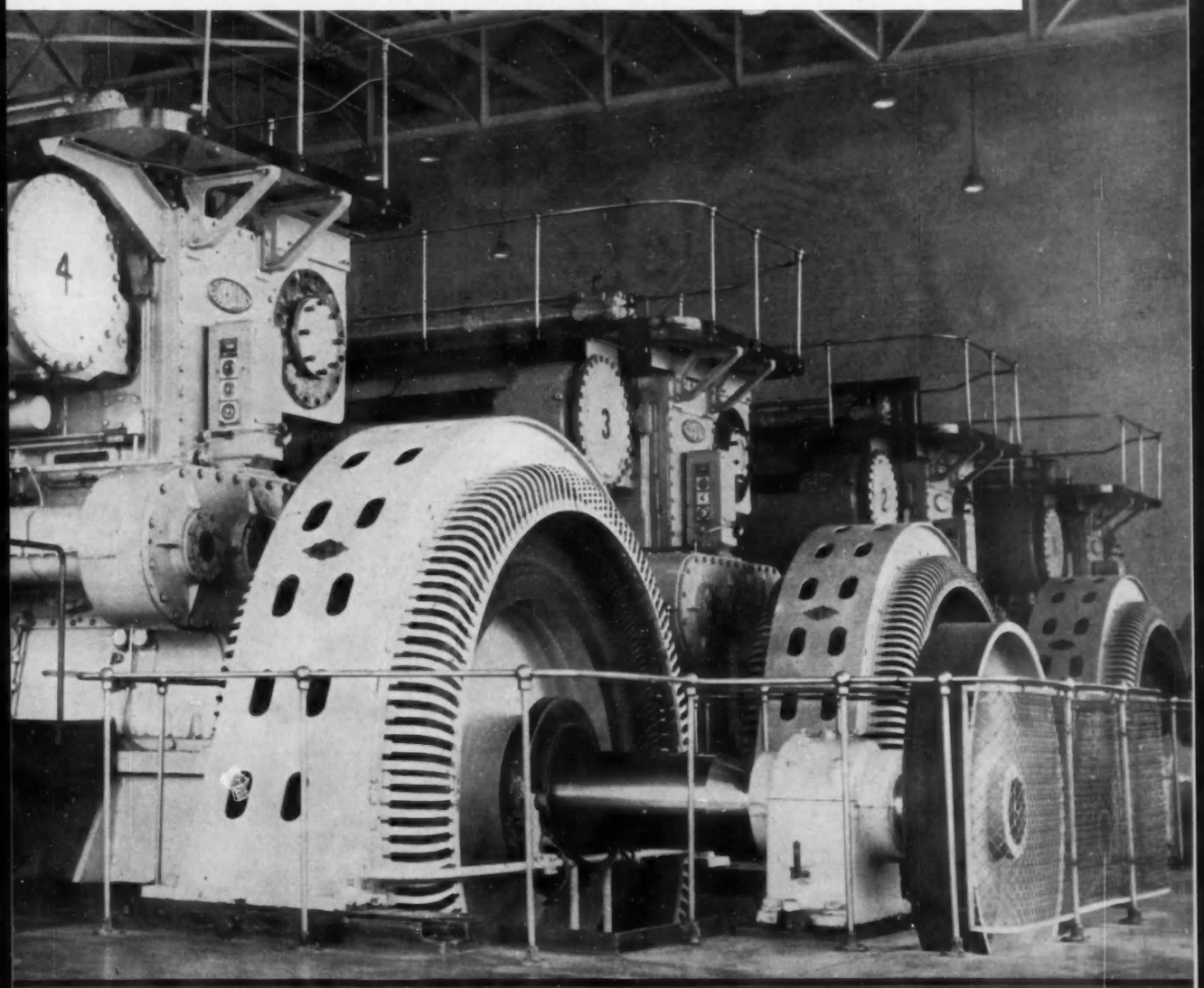
These benefits, consistently delivered, account for the fact that—

For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

A Texaco Lubrication Engineer will gladly help you select the proper *Texaco Ursa Oil* for your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

ELECTRIC POWER

DELCO-REMY HEAVY-DUTY A.C. GENERATORS

Delco-Remy A.C. generators with companion regulators and rectifiers are the hearts of 12-volt A.C.-D.C. electrical systems designed specifically for modern Diesel buses with fluorescent lighting and extra-heavy electrical loads.

Desirable performance characteristics include cut-in at low generator rpm . . . maximum outputs (ranging up to 180 amperes) at low to medium speeds. The new generators supply not only alternating current for fluorescent lights but also ample direct current for the heaviest electrical loads coupled with lengthy engine-at-idle periods.

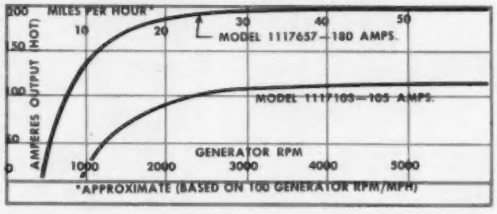
Impressive features of the new generators are their light weight, very high output capacity, and ability to operate over a wide speed range with greatest efficiency. Specify Delco-Remy electrical equipment on your new buses.

A.C. GENERATOR PERFORMANCE DATA (HOT)

Model	Volts	Cut-In RPM	Curb Idle Amperes*	Maximum Amperes	Power Watts SAE	Recommended For
1117103	12	960	5	105	1575	All speeds.
1117657	12	550	130	180	2700	All speeds.
1117062-3-4	6	750	38	90	720	All speeds.

*APPROXIMATE (BASED ON 1000 GENERATOR RPM)

A.C. GENERATOR OUTPUT CURVES (HOT)



*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)

DELCO-REMY HEAVY-DUTY D.C. SPLIT-FIELD GENERATOR (120-Ampere Output Capacity)

The Delco-Remy 12-volt split-field generator and its companion regulator are rugged and dependable—designed to meet the needs of Diesel transit buses having increased electrical loads coupled with a high percentage of engine idling time.

Desirable performance characteristics include low cut-in, maximum output at less than 1,000 generator rpm. Note performance table at right.

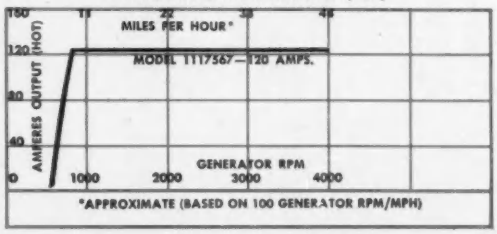
Operating benefits include reduced battery cycling, long battery life, and a simplified electrical system with sustained voltage—at no sacrifice in ruggedness or dependability.

D.C. GENERATOR PERFORMANCE DATA (HOT)

Model	Volts	Cut-In RPM	Curb Idle Amperes*	Maximum Amperes	Power Watts SAE	Recommended For
1117567	12	560	120	120	1800	Low speed & idling.

*APPROXIMATE (BASED ON 1000 GENERATOR RPM)

D.C. GENERATOR OUTPUT CURVES (HOT)

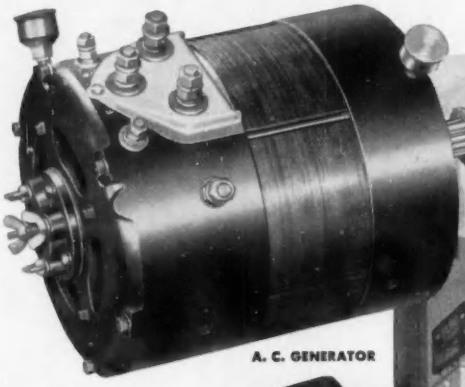


*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)

Delco-Remy
ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

right for the job



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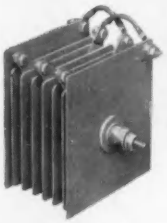

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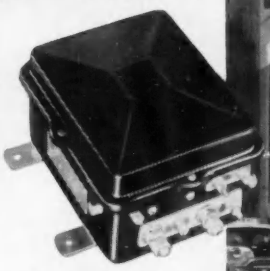
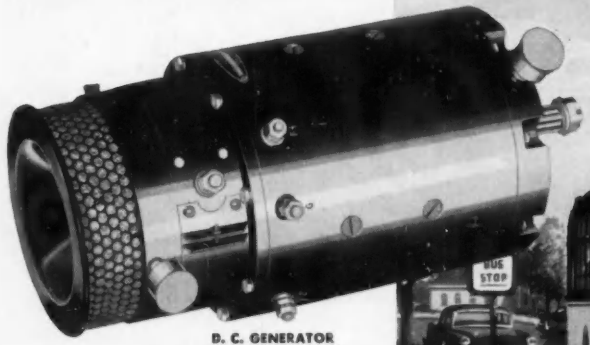


REGULATOR



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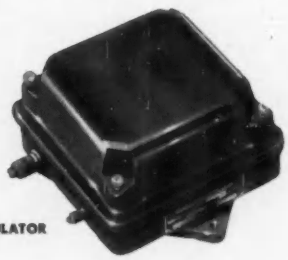
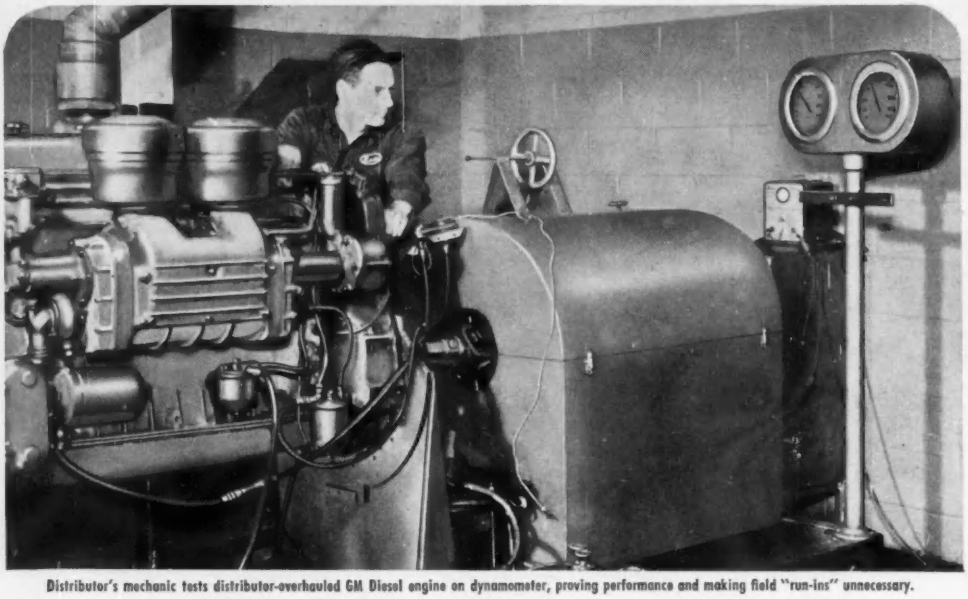


REGULATOR

WHEREVER WHEELS TURN OR PROPELLERS SPIN



Distributor's mechanic tests distributor-overhauled GM Diesel engine on dynamometer, proving performance and making field "run-ins" unnecessary.

There's no place like "home" for

GM DIESEL SERVICE

You'll find it pays to call your General Motors Diesel distributor for any service on your GM Diesel engines—including complete overhauls.

Because when you put your GM Diesel in the hands of his factory-trained mechanics you get:

- **Fast Service** by men who have the *latest factory information* at their finger tips, plus a complete stock of *factory-approved* GM Diesel parts.
- **Better Service** because these mechanics have the right tools and equipment to handle every GM Diesel service job.
- **Proved Service** because your distributor thoroughly checks every engine before it leaves his shop—dynamometer-tests his overhauled engines to make sure they deliver full power back on the job.

It's just about time to get your GM Diesel engines ready for winter—a job your GM Diesel distributor is all set up to handle. Call him out to your job today and while he's there ask him about regular preventive maintenance inspections for your GM Diesel engines. He'll set up a low-cost program that will pay off in top performance all year round.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines . . . . . 30 to 300 H.P.
Multiple Units . . . . . Up to 893 H.P.

GENERAL MOTORS DIESEL DISTRIBUTORS

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GENERAL MOTORS
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PARTS and SERVICE

at the sign of AUTHORIZED parts and service

editors notes...

You'll want to read about...

Some things to know when selecting and applying torque converters and associated drive-line equipment. Correct matching and selection of the proper components will give you new standards of performance and efficiency. . . .

How the F-M opposed-piston engines perform in pipeline pumping applications. . . .

How a new cleanable strainer that removes particles down to 37-micron size can save you money in filter element replacements. When you get the details, you may want to review your whole lube oil filter system design. . . .

The principles that sold the railroads on diesel-electric drives are now applied to good advantage in the oil well drilling field. . . .

How chromium plating is being used to reclaim worn crankshafts. A good job—and this article tells some of the things to look for—will not only greatly improve service life but restore standard sizes. . . .

Two dual-fuel B-L-H engines that when installed will double the capacity of the Natchitoches, La., municipal power plant. . . .

Caterpillar's recommendations for cleaning pistons. Side clearances for rings in the main and starting engines are given and permit a good check on groove wear. . . .

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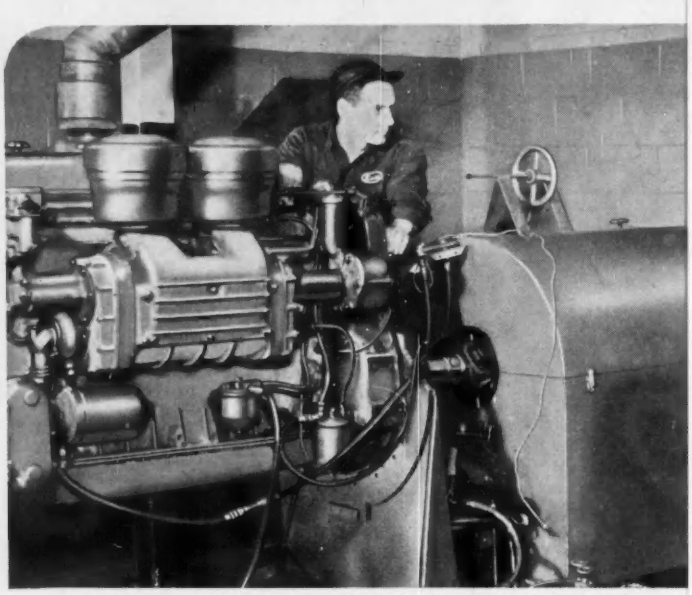

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There's no place like "home"

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You'll find it pays to call your General Motors Diesel distributor for any service on your GM Diesel engines—including complete overhauls.

Because when you put your GM Diesel in the hands of his factory-trained mechanics you get:

- **Fast Service** by men who have the *latest factory information* at their finger tips, plus a complete stock of *factory-approved* GM Diesel parts.
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It's just about tim gines ready for wi distributor is all se to your job today about regular pre tions for your GM low-cost program formance all year

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PARTS and SERVICE

You'll want to read about...

Experimental use of valve inserts for reclamation of locomotive engine cylinder heads shows promise of doing the job while cutting costs. Use of an automotive cylinder borer and adapter for cutting accurate counterbores is described. . .

Next month's feature about a survey of the lube oil and filter change practices of 14 small trucking outfits. Their problems may be like yours and if so, you'll be glad to know that we are starting a series of articles covering the problems uncovered by the survey. . . .

And in the meantime, read the features in this issue; they're shaped to your needs. . . .

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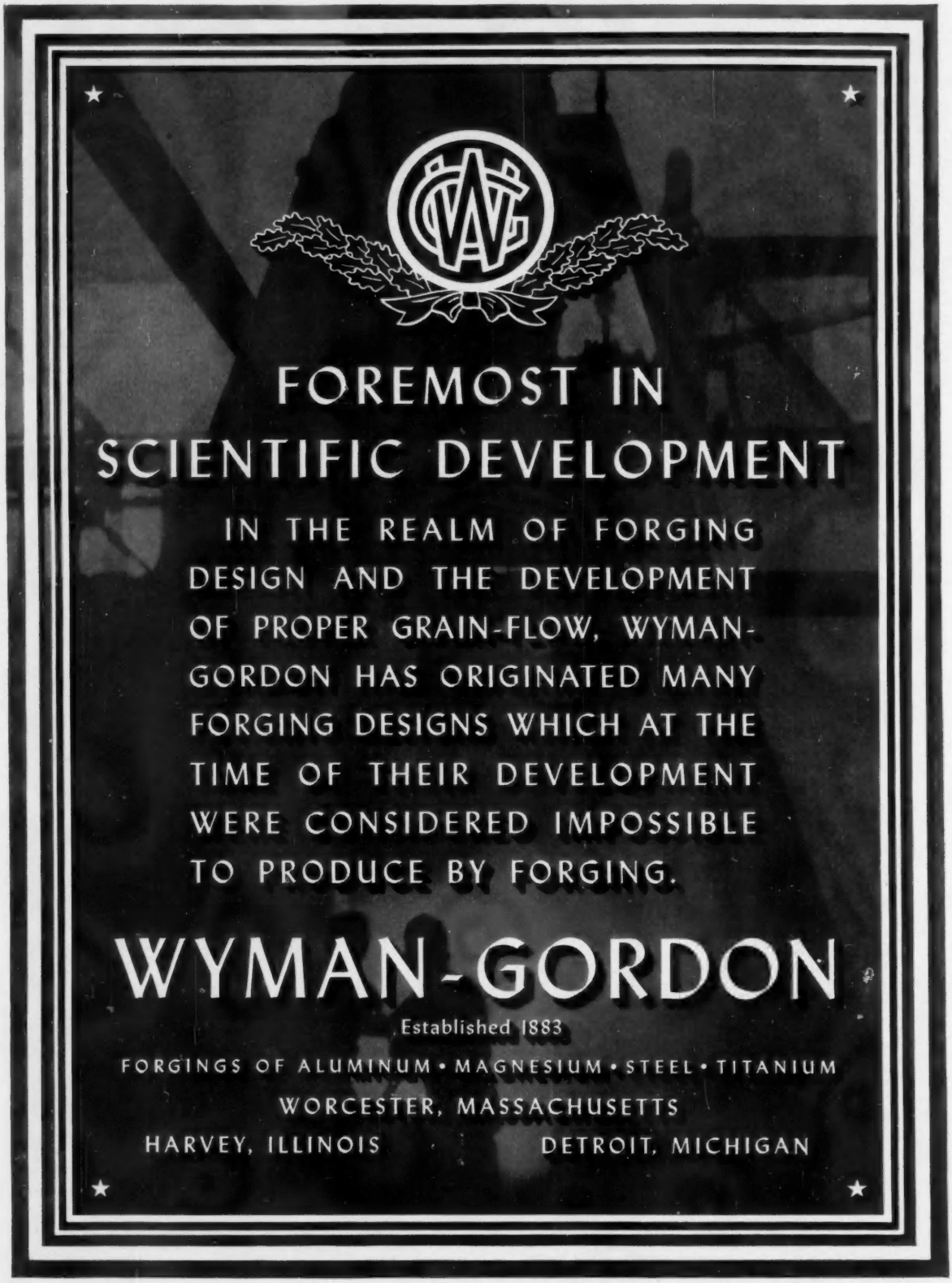
FOREMOST IN
SCIENTIFIC DEVELOPMENT
IN THE REALM OF FORGING DESIGN AND THE DEVELOPMENT OF PROPER GRAIN-FLOW, WYMAN-GORDON HAS ORIGINATED MANY FORGING DESIGNS WHICH AT THE TIME OF THEIR DEVELOPMENT WERE CONSIDERED IMPOSSIBLE TO PRODUCE BY FORGING.
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Established 1883
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM
WORCESTER, MASSACHUSETTS
HARVEY, ILLINOIS
DETROIT, MICHIGAN

County Courthouse, Newkirk, Oklahoma

Where does the Court get its power?

For seven years in Newkirk, Oklahoma, one powerful machine controlled the power of the court...a Fulton 800 H.P. dual-fuel generating unit, lubricated by Cities Service Pacemaker #5 Oil.

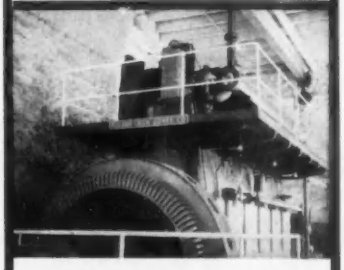
But it wasn't only the court that depended upon this one machine . . . the entire town relied upon it. If the machine failed, so might the annual grain harvest, for Newkirk's grain elevators require great quantities of power.

BUT THE FULTON GENERATING UNIT AND CITIES SERVICE LUBRICATION PROVIDED FAULTLESS SERVICE. There was never a breakdown.

Newkirk's power boss, Superintendent of Utilities Ralph E. Cottrell, sums it up this way: "Using Pacemaker #5 in the engine's crankcase and cylinder lubricators, we not only enjoyed trouble-free operation during those seven years, but also surprisingly little wear and oil consumption. Rings, bearings and liners remained in top notch condition and the engine piled up well in excess of 6000 horsepower hours per gallon of oil."

This is but one more powerful story of Cities Service Lubrication . . . a graphic illustration of the kind of results you can expect from these highest quality lubricants. Why not get the whole story from a Cities Service Lubrication Engineer? Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

Ralph E. Cottrell, Power Boss of Newkirk, Oklahoma. All of Newkirk depends on him as Supt. of Utilities. He depends on Cities Service Lubricants for town's power generators.



Powerful Machine Behind The Court is this Fulton 800 H.P. dual-fuel generating unit. For seven years Newkirk's only major power source, it gave "faultless performance" using Cities Service Lubricants.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

SOLVE vibration • movement • expansion problems

SIMPLIFY offset connections

REDUCE maintenance ...in diesel exhaust, air, oil and water piping

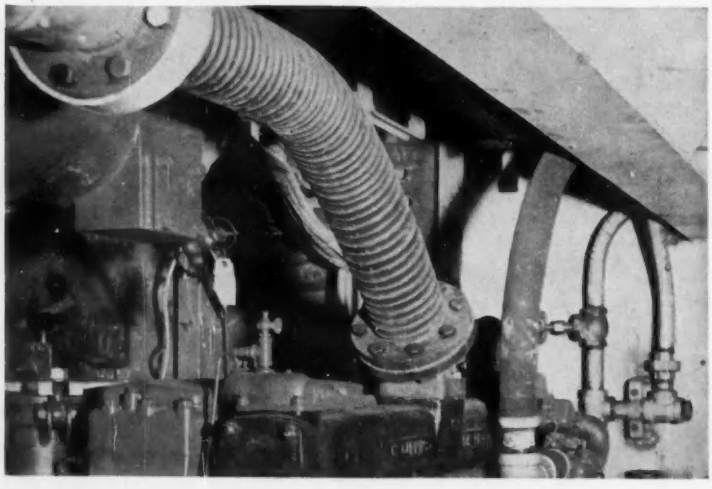
In diesel engine piping systems, American flexible metal hose offers a practical solution to problems of vibration and expansion, the principal reasons for accelerated failure of rigid pipe. It's simpler to install, too. You *bend* it into position, saving time on the job and making easy work of fitting offset connections.

For heavy-duty exhaust and air intake lines, specify American Flexible Steel Corrugated Hose. It adjusts to expansion and dampens engine vibration, preventing excessive stress on exhaust manifold flange bolts and fittings. Vibration dissipates in the hose and is not transmitted to adjacent structural members. Assemblies are supplied complete with floating flanges to simplify lining up with companion flanges.

To convey air, oil and water, use American Seamless Flexible Metal Tubing. Made in bronze or carbon steel for standard service, and in stainless steel or Monel for special service. Tubing has woven wire braid covering for added strength. Complete assemblies include fittings.

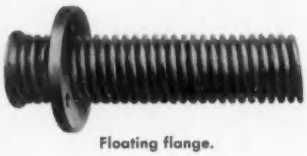
55199

Below: Flexible, corrugated steel hose carries hot diesel exhaust gases to atmosphere.



Type Y-10 flexible, corrugated exhaust hose assembly with floating flange, left, and fixed flange. ID's 2" through 16".

Type Y-10 hose with welded nipple, supplied with or without flange.



Floating flange.

Type S-1 braid-covered seamless flexible metal tubing for air, oil and water lines. Seamless tubing is 100% tight and extremely flexible. ID's ⅛" through 12". Usually furnished with fittings attached.

WANT MORE INFORMATION? Bulletin EH-50 gives detailed engineering data on American flexible metal hose and tubing for diesel engines. We'll be glad to send you a free copy, or have one of our sales engineers call. No obligation of course. Address *The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn.* In Canada: *The Canadian Fairbanks-Morse Company Ltd.*

WHEREVER CONNECTORS MUST MOVE

AMERICAN

FLEXIBLE METAL HOSE AND TUBING

AN

ANACONDA®

PRODUCT

MORE PULL WITH LESS FUEL!

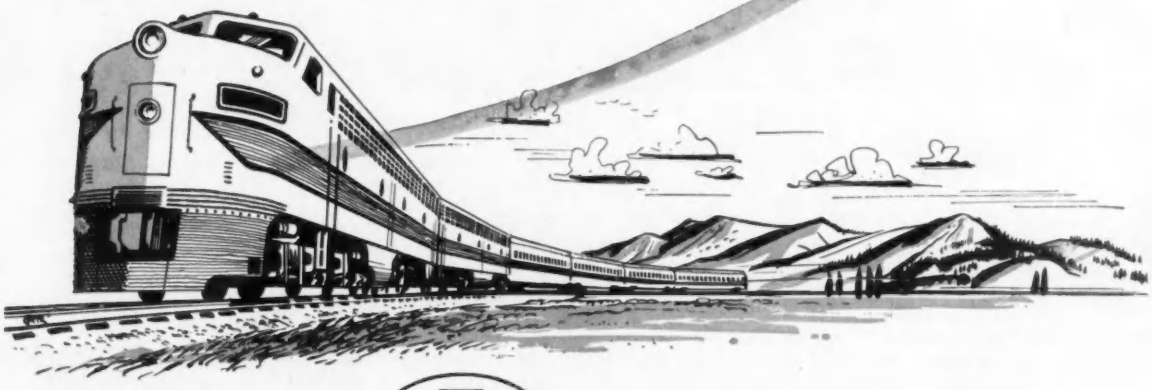
AiResearch Turbochargers provide rapid response to acceleration demands... end objectionable smoking!

Consider what the application of AiResearch Turbochargers to diesel locomotives will accomplish: A team of these small power packages will provide a greater increase in power at smaller cost in space and weight than any comparable turbocharger or supercharger installation.

In addition, specific fuel consumption on a horsepower per hour basis will be far less. Sea level performance will be restored within operating limits at altitude, response to acceleration demands will be rapid and excessive smoking under operating power eliminated. Also, the noise level will be greatly reduced.

Application in other fields will be equally effective, as has already been demonstrated in the remarkable results achieved by the installation of AiResearch Turbochargers on Caterpillar diesel machinery.

AiResearch is the largest producer of small turbomachinery in the United States, with twenty-five *million* hours of experience. This unmatched experience explains why AiResearch Turbochargers lead in power, economy and dependability.
Your inquiries are invited.



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AiResearch Industrial Division

9225 Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

BEARINGS...

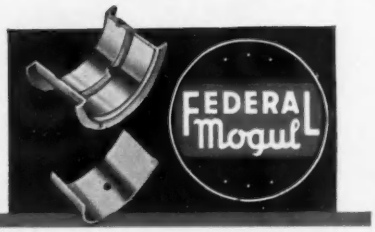
A Control Factor in Performance!

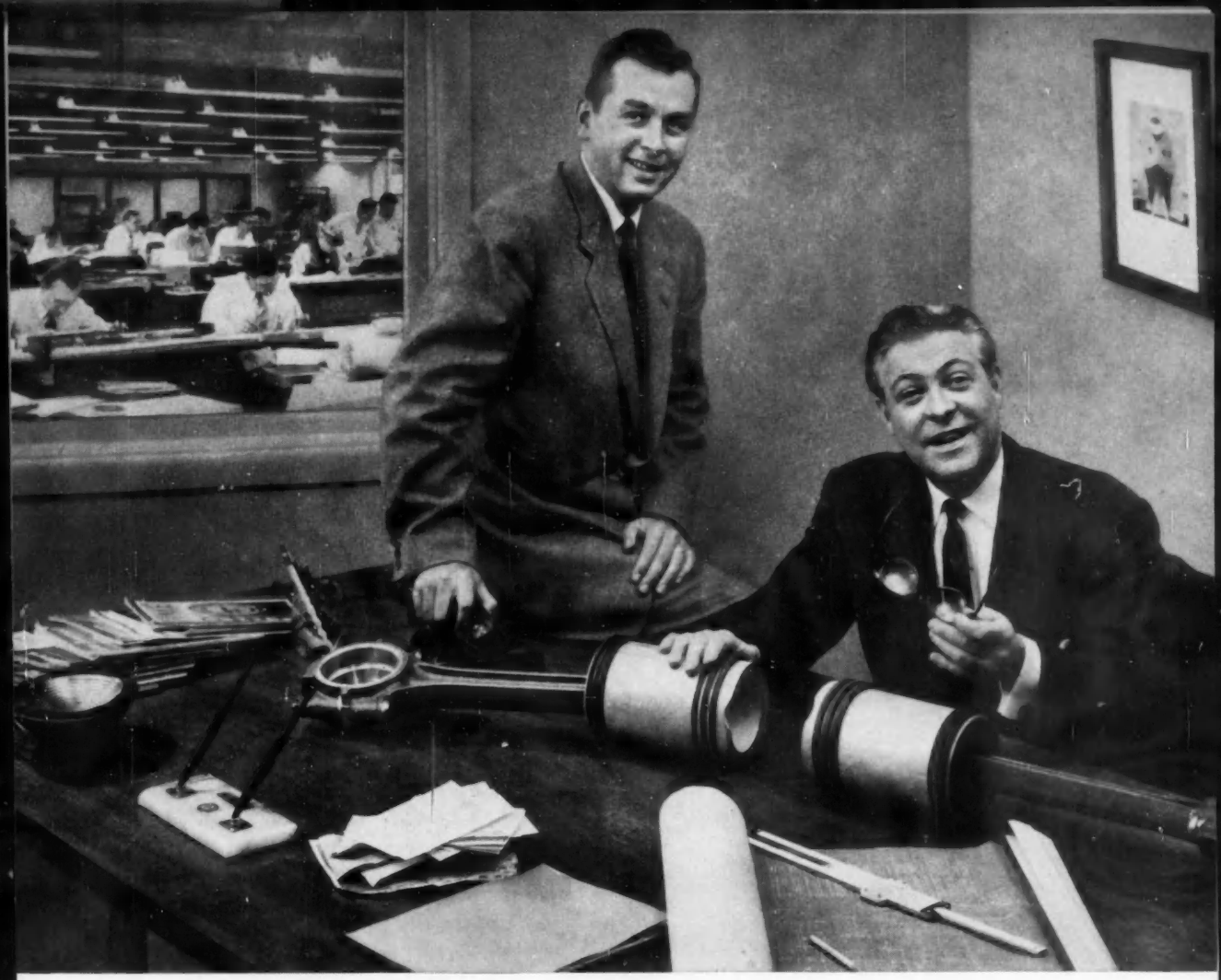
RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING

The finest performance in the world is built into American cars—with the help of precision-made sleeve bearings. They are asked to carry the thrust loads of pistons, endure extreme heat, protect the crankshaft and maintain internal lubrication. Their dependability is assured under the most severe load and road operating conditions. We are specialists in quality bearings and bushings for engine, transmission and chassis applications, and a major supplier to the car-building industry. Federal-Mogul Corporation, Detroit 13, Michigan.

FEDERAL-MOGUL

SINCE 1899





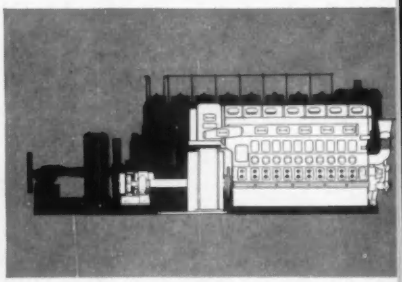
They were asked, "Why two when one will do?"

That's often the first reaction to the Fairbanks-Morse Opposed Piston Diesel . . . "Why two pistons?"

The answer given by the F-M Diesel Design Staff is quite simple: two pistons reacting to the forces of combustion in a common cylinder give you greater horsepower per cylinder . . . more power per foot of floor space . . . far less vibration, and, as it happens, a far more simple engine with 40% fewer moving parts to wear and maintain.

Only from Fairbanks-Morse can you get such originality and soundness of *new* design that assure outstanding performance. When next you need a Diesel Engine . . . or a scale . . . an electric motor . . . or a pump, look for the famous F-M Seal and see the difference that quality makes. Fairbanks, Morse & Co., Chicago 5, Illinois.

The Secret is this cylinder liner that contains two pistons. It eliminates cylinder heads and their gasketed joints, intricate valve trains and their timing—all parts that require skilled maintenance.



The Result is a compact, lightweight diesel that permits installing *more* horsepower in the *same* space occupied by any other comparable engine. And horsepower for horsepower, the O-P is the easiest to maintain.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

COMPARE

INSTALL JUST ONE SET OF DaRoS PISTON RINGS IN YOUR EQUIPMENT AND DISCOVER THE BIG DIFFERENCE

DaRoS Piston Rings are *not* ordinary rings! Made of Swedish Charcoal Iron, they have a lower rate-of-wear than other rings. Wear on cylinders is less, too. That means less "down-time" for your equipment—thousands of more operating hours between ring renewals and cylinder reconditioning!

What's more, DaRoS Rings do *not* leak. They maintain complete efficiency in either new or worn cylinders—resulting in big fuel savings! You actually save 10% to 15% on fuel costs.

Discover the *big* difference DaRoS Piston Rings can make in your equipment. Just one installation will convince you. Write, wire or phone for recommended application and prices now.

IMMEDIATE DELIVERY FROM CHICAGO on all Popular Sizes

(This is ad #7 in a series designed to tell Diesel Operators the important story about DaRoS Swedish Iron Piston Rings.)

DaRoS AMERICAN CORPORATION

D. D. Cook, President

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Distributors for North, Central and South America

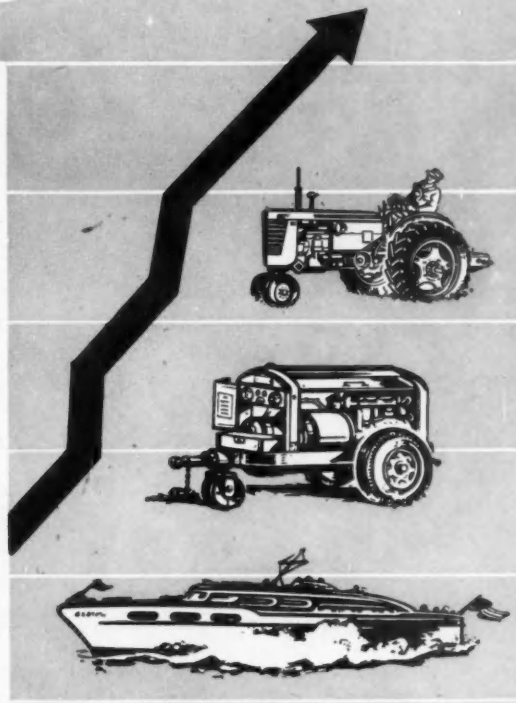
the UP and UP story on the AMERICAN BOSCH PSB!

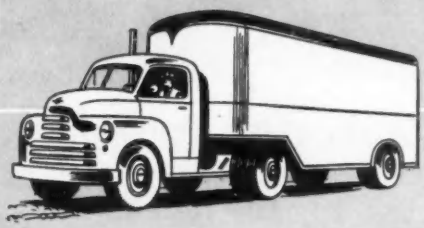
The introduction of the American Bosch "PSB" single-plunger distributor type fuel injection pump several years ago helped make smaller, lower-cost Diesels possible—and practical—for farm tractors, compressors, generating equipment, boats and trucks. Today, there are many thousands of PSB equipped Diesels in use, and their number is increasing at a rapid pace.

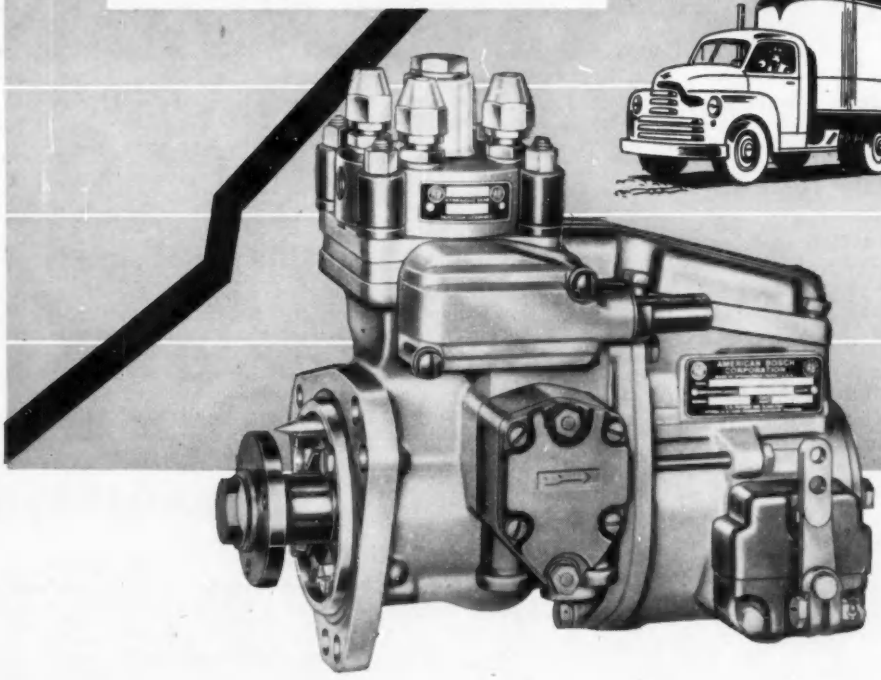
These simplified, compact pumps have an outstanding record for performance and dependability—assure users of long trouble-free service and low maintenance expense. No wonder production of American Bosch PSB pumps goes UP and UP month after month to meet the demand. American Bosch, Springfield 7, Massachusetts.

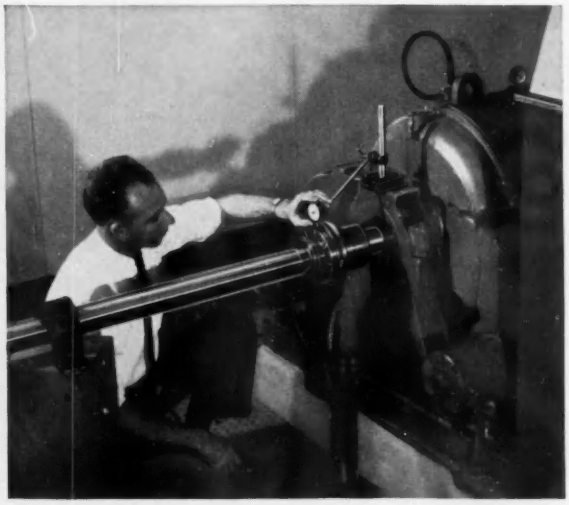
AMERICAN BOSCH

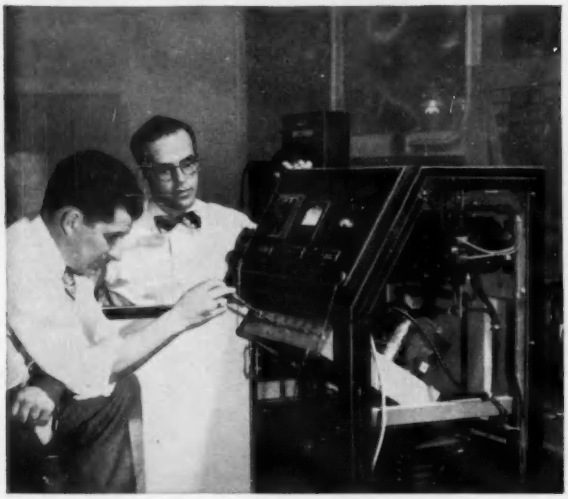
Division of
American Bosch Arma Corporation

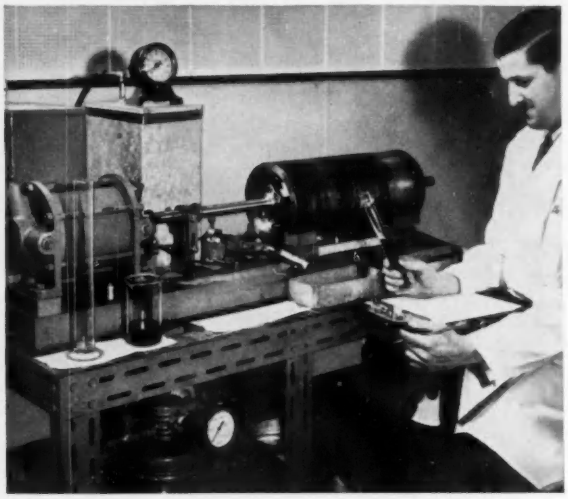












New Koppers Development Laboratory tests Piston Rings for longer life . . . better performance!

At the Koppers Metal Products Division, engineers and technicians are at work in a new Mechanical Development Laboratory. Their purpose—to maintain Koppers leadership by improving present products and developing new products and adaptations.

One of the laboratory's primary functions is to design, produce and test new developments in piston rings and metallic sealing rings. This extensive program includes every phase of study from complete metallurgical research to actual engine testing for endurance and operating characteristics. Now and in the future, Koppers American Hammered Industrial Piston Rings will continue to mean *better* piston rings—engineered to give you *better performance.*

The new Koppers Mechanical Development Laboratory will benefit all industry. To put these benefits to work directly for you, consult Koppers whenever you have any problem in piston or sealing rings.

New lab studies all Koppers products

Research and testing under way in the new Koppers Development Laboratory includes: Endurance and operating tests for couplings, engine tests for piston and sealing ring endurance and characteristics, new precipitator controls and electrical equipment, pilot-plant tests of gas flow and distribution . . . and many more developments that will keep *all* products of Koppers Metal Products Division the most advanced in their field.

AMERICAN HAMMERED

Industrial Piston Rings

KOPPERS ®

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC., 1548 HAMBURG ST., BALTIMORE 3, MD. This Koppers Division also supplies industry with Fast's Couplings, Aeromaster Fans, Electrostatic Precipitators, Gas Apparatus.

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See the world's newest

LIGHTWEIGHT TRAIN

at the

GENERAL MOTORS powerama

Lake Shore Drive next to Soldier Field
Chicago — Aug. 31 through Sept. 25

Railroad history may start a new chapter when the Electro-Motive Division presents General Motors' concept of the train that can put the railroads in a strong new competitive position in the passenger field.

Plan *now* to see how revolutionary new design and Air Suspension springing will put new scheduled speed, a new concept of comfort and striking economies behind the railroads' bid for travel business.

See, too, the revolutionary Frigifrator—Mobile Power Cars and Trailer—a real oil drilling rig in action—the rebirth of a locomotive—dozens of fascinating exhibits, all part of the tremendous spectacle of the Powerama.

This celebration of General Motors' 100 Millionth Diesel Horsepower will be literally a World's Fair of Power. Acres of absorbing demonstrations will give "sidewalk superintendents" ringside seats as mechanical monsters show their abilities.

And there's a great outdoor stage show—music—dancers—spectacular acts built around behemoth machinery—jet plane formation flying—a vertical-take-off plane in action—really a host of thrilling, informative sights you shouldn't miss.

Start making arrangements now to see the GM Powerama.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS

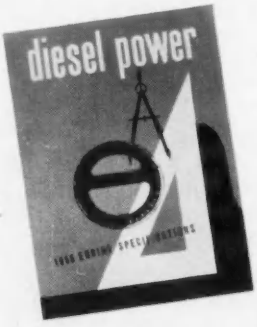
CORRECTED*

Ratings for ENTERPRISE dependable ENGINES

Enterprise Engine & Machinery Co.
Subsidiary of General Metals Corp.
18th & Florida Streets, San. Francisco, Calif.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Cont. HP.	Cont. R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
DM3	D*	M-S-P	4	3	8 x 10	73-162	450-1000	S	LM-P	A-E	....	**	55	43	66	5600
DM33	D	M-S-P	4	3	8 x 10	137-381	450-1000	S	LM	A-E	T	**	55	43	73	6300
DM4	D	M-S-P	4	4	8 x 10	97-216	450-1000	S	LM	A-E	....	**	67	43	66	7900
DM34	D	M-S-P	4	4	8 x 10	183-508	450-1000	S	LM	A-E	T	**	67	43	73	8700
DM6	D	M-S-P	4	6	8 x 10	146-324	450-1000	S	LM	A-E	....	**	91	43	66	10800
DM36	D	M-S-P	4	6	8 x 10	274-762	450-1000	S	LM	A-E	T	**	91	43	74	11400
DM8	D	M-S-P	4	8	8 x 10	194-432	450-1000	S	LM	A-E	....	**	116	43	68	13700
DM38	D	M-S-P	4	8	8 x 10	366-1015	450-1000	S	LM	A-E	T	**	116	43	82	15600
DG-6	D	M-S-P	4	6	12 x 15	273-819	250-750	S	LM	A	....	D	145	47	96	33500
DG-36	D	M-S-P	4	6	12 x 15	482-1735	250-750	S	LM	A	T	D	145	47	96	34600
DG-8	D	M-S-P	4	8	12 x 15	364-1092	250-750	S	LM	A	....	D	179	47	96	42700
DG-38	D	M-S-P	4	8	12 x 15	643-2313	250-750	S	LM	A	T	D	179	47	96	44662
DQ-6	D	M-S-P	4	6	16 x 20	647-1036	250-400	S	LM	A	....	D	206	60	124	77300
DQ-36	D	M-S-P	4	6	16 x 20	1142-2193	250-400	S	LM	A	T	D	206	60	124	79500
DQ-8	D	M-S-P	4	8	16 x 20	863-1381	250-400	S	LM	A	....	D	252	60	124	95413
DQ-38	D	M-S-P	4	8	16 x 20	1523-2924	250-400	S	LM	A	T	D	252	60	124	97813
DR-6	D	M-S-P	4	6	17 x 21	767-1228	250-400	S	LM	A	....	D	206	60	124	79800
DR-36	D	M-S-P	4	6	17 x 21	1354-2600	250-400	S	LM	A	T	D	206	60	124	82400
DR-8	D	M-S-P	4	8	17 x 21	945-1637	250-400	S	LM	A	....	D	252	60	124	97200
DR-38	D	M-S-P	4	8	17 x 21	1805-3467	250-400	S	LM	A	T	D	252	60	124	99800
DRV-12	D	M-S-P	4	12	17 x 21	1228-2455	200-400	S	LM	A	....	D	197	96	145	132600
DRV-12-3	D	M-S-P	4	12	17 x 21	2891-5782	200-400	S	LM	A	T	D	197	96	145	137900
DRV-16	D	M-S-P	4	16	17 x 21	1637-3274	200-400	S	LM	A	....	D	245	96	145	171800
DRV-16-3	D	M-S-P	4	16	17 x 21	3855-7710	200-400	S	LM	A	T	D	245	96	145	179000

*All models available with trifuel equipment **Reverse and reduction gear used—make varies.



*The Enterprise Engine ratings published in the April, 1955 issue of Diesel Power, and later reprinted for subscribers, were incorrect. The incorrect Horsepower and RPM figures and Weights resulted from a mix-up in printer's copy.

May we suggest that you clip this page and place it between pages S-4 and S-5 in your Engine Specifications reprint? Note particularly the horsepower ratings for Enterprise Engines, and the new line of Enterprise V-Type 12 and 16 cylinder models.

Enterprise leads the way with a complete line of heavy-duty engines from 73 to 7710 HP, in stationary, portable and marine models. Write for complete information, or call your nearest Enterprise sales office.

Over a million horsepower at work the world over!

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ENTERPRISE ENGINE & MACHINERY CO.
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18th and Florida Streets, San Francisco 10, California
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A New PM TOOL for Diesel and Gasoline Engines

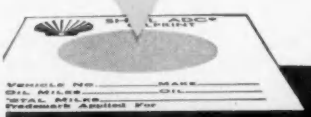
SAVE Time, Money, Oil and Engines with the Shell ADC* Oilprint Analysis

Now—operators can test crankcase oil in the short time allotted for re-fueling and oil level checks. The Shell ADC Oilprint Analysis gives a practical and accurate oil evaluation in minutes.

ADC Oilprint Analysis means big savings when used in your preventive maintenance program . . . gives valuable information on engine and oil conditions. It answers the question "When do I change my oil?" thus eliminating the draining of usable oil and the risk of using oils loaded with contaminants.

See for yourself how the new Shell ADC Oilprint Analysis can save you real money in preventive maintenance. *Trademark

Let us demonstrate how you can use this Service for Your Equipment



SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

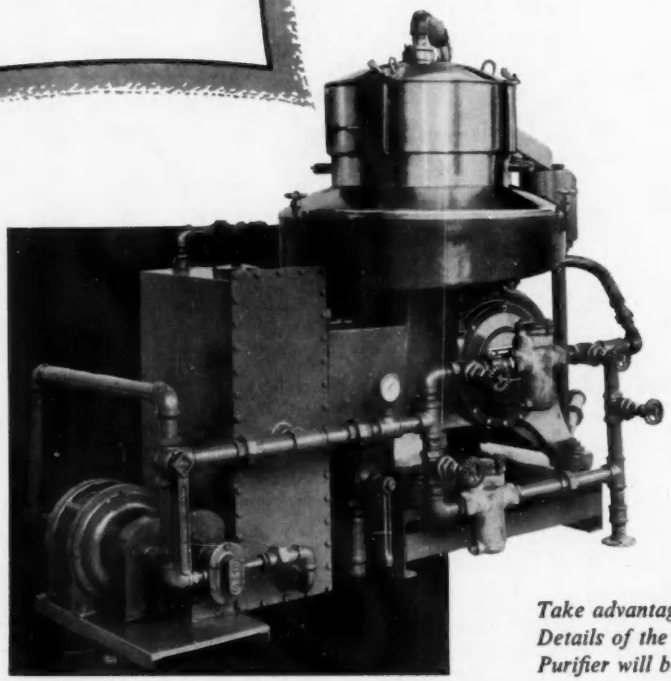
SHELL

MEMO

Ask Diesel Engine Manufacturers About Burning Residual Oils

There is no trick to burning "bunker C" in diesel engines, nor is there any doubt of the large savings made possible by doing so. As the number of engines burning purified residual oils steadily increases, the facts speak plainly for themselves.

The Sharples Residual Oil Purification System, which continuously removes and discharges the unburnable solids, eliminates a "big headache" now associated with purifying residual oils—frequent shut-downs for bowl cleaning.



Take advantage of low cost residuals. Details of the Sharples Continuous Purifier will be sent on request.

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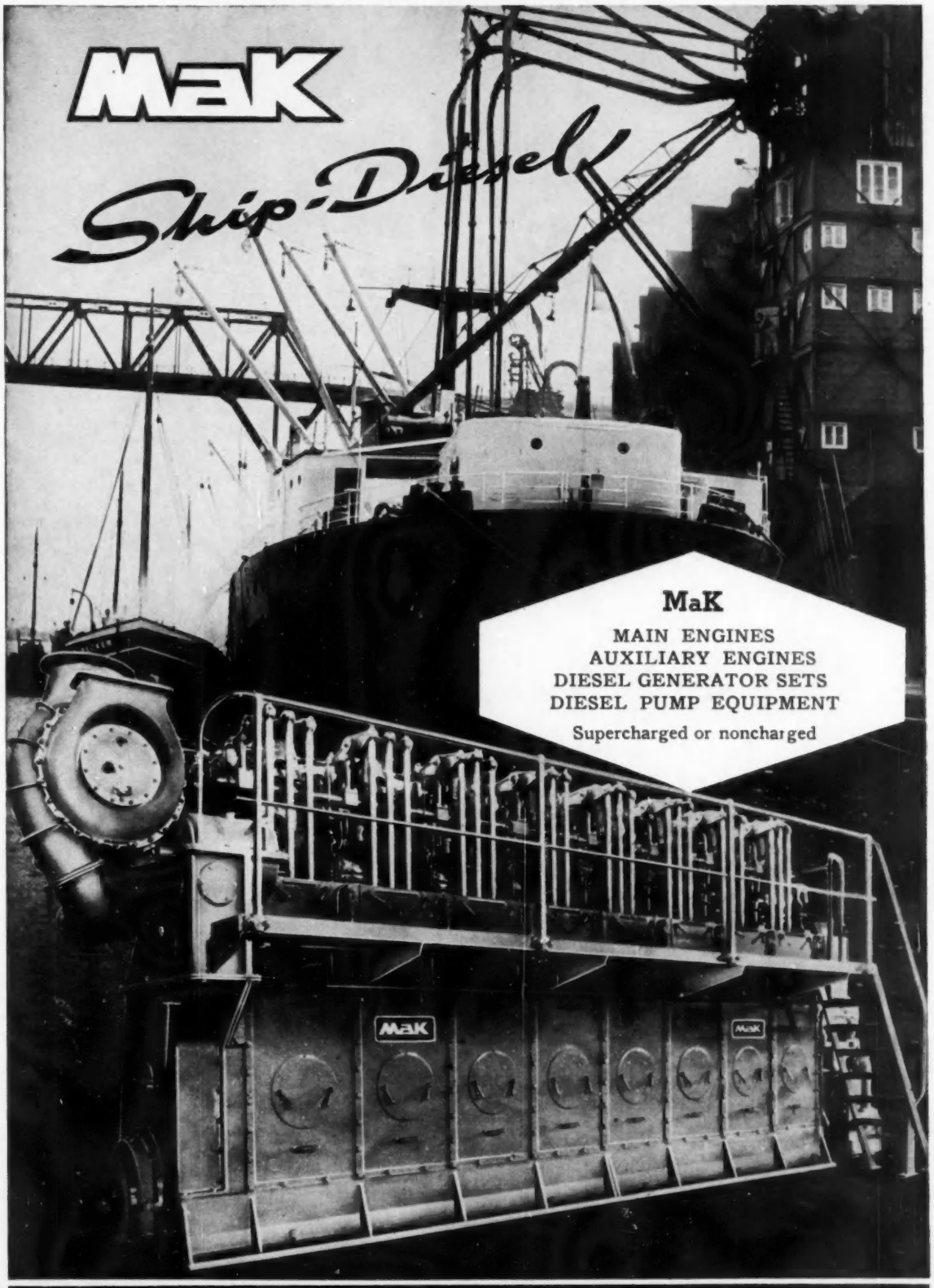

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"Our recent Payroll Savings Campaign at Northrop demonstrated the belief of our personnel and our company in the basic fundamentals of American good citizenship—staunch support of our Country and personal thrift.

"At the completion of the campaign we had over 17,000 regular savers—over 80% of all Northrop personnel buying U. S. Savings Bonds regularly on the Payroll Savings Plan. Every employer should stage a similar campaign for the benefit of his personnel and the economic welfare of our Country."

WHITLEY COLLINS, ***President***
Northrop Aircraft Company

If less than 60% of your personnel are Payroll Savers, do something about it. A phone call, telegram or letter to Savings Bonds Division, U. S. Treasury Department, Washington, D. C., will bring prompt assistance from your State Director. He will help you install, or revitalize a Payroll Savings Plan, through a simple, person-to-person canvass which your personnel will be glad to conduct. That's all you have to do—your men and women will do the rest.

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DIESEL POWER

The Engineer's Report

CASE HISTORY

PRODUCT RPM Delo Oils

FIRM Bagdad Copper Corp., Bagdad, Arizona

Biggest truck in the world uses RPM DELO Oil!

246,000 POUNDS TOTAL LOAD, 48 tons of truck and 75 tons load, are hauled out of the Bagdad Copper Corp.'s ore pit at Bagdad, Arizona, by the two 350 h.p. supercharged diesels in this unit. RPM DELO Special Lubricating Oil is used in the engines as specified by Mr. Ernest Dickie, General Manager of Bagdad, on the basis of his years of experience with RPM DELO Oils in many other heavy-duty engines.

The big truck, described as the largest in the world, was designed by Mr. Dickie and engineers of Dart Truck Co., builders. Power is transmitted through 3-stage torque converters. All controls are powered.

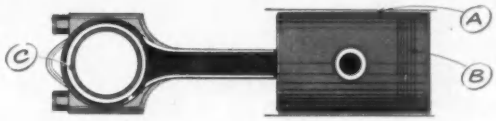
FREE FOLDER tells you about all the RPM DELO Oils and how they meet every heavy-duty engine condition. Write or call for it today.

FOR MORE INFORMATION about petroleum products of any kind or the name of your nearest distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U. S. PAT. OFF

How RPM DELO Oils reduce wear, corrosion, oxidation in all heavy-duty engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
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atlantic

FLEXIBLE METAL HOSE

When diesels power trucks hauling 70,000 lb. loads of logs over mountain roads — or locomotives and ships, Atlantic flexible metal hose is usually given the job of guarding those vital diesel life lines—water, fuel, exhaust.

Atlantic flexible metal hose is manufactured to tough specifications.

Wall thickness is absolutely uniform. Tight against water, oil, steam, gas and air. Requires no maintenance. Atlantic flexible metal hose dampens vibration, remains flexible at higher temperatures.

There is an Atlantic flexible metal hose for each of these applications. Made in bronze, steel, stainless and monel—⅛"-36" I.D. with required fittings.

For misalignment and vibration

JOB TESTED CERTIFIED

Write for Diesel Bulletins 1020 & 50A. See our Catalog in Sweet's Product Design File.

ATLANTIC METAL HOSE CO., INC.

309 DYCKMAN ST., NEW YORK 34, N. Y.

Dramatizing Diesels

Turn on the TV. You're soon aware of the therapeutic value of cigarette filters; that spark plugs, ignition coils, batteries and the like can be taught to march; and that one and only one car can satisfy your most exacting demands. You might dismiss all this as being in the realm of stimulating consumer demand except that banks, steel and nickel companies, and builders of industrial products get into the act. Well, what's the pitch? You would figure that only a few viewers would be logical targets. Disqualifying ourself as an expert witness, we leave the subtle nuances of motivation to others. But one thing is clear: Each industry plays an important role in the overall economy and thus has a story to tell. In telling it, they create awareness of this importance and associate themselves with progress in their field. With the seed of public knowledge and acceptance sown, there's no telling how far-reaching the effects will be. Our industry has done spectacular things in a quiet way for years. It revolutionized the railroads; inland waterway transportation; the earthmoving and roadbuilding industries; to name a few examples. It's an achievement story to dramatize and GM's going to do it. From August 31st to September 25th on a 26-acre site, adjacent to Soldier Field, Chicago, the public can see diesels at work. This "Powerama" commemorates production of GM's 100-millionth horsepower. Sure, it's a GM show all the way. But you can't publicize diesels without publicizing our whole industry. Visitors will learn at first hand something of diesel capabilities; millions more will read of it since this dramatic display is good copy for the nation's press. We're confident that some of the diesel interest generated will be converted to sales. GM will get their share and so will others. Promotion of a segment of industry promotes the whole industry. It's a time-proven formula in our economy that can't miss. This is the first time that it has been applied to our industry on this scale. We're rooting for it; we think that it will be good for the whole industry.

BPE

Cyclan
RING IRON
has extra high impact value for shock resistance!
• Combines the best characteristics of iron and steel.
• Equals or surpasses the wearing quality of cast iron.
• Approximates the strength of steel.
• Retains true shape even after much deflection.
• Stands up in super-charged engines.
• Can be readily chrome-plated.
• Functions efficiently without chrome plating.
• Has high resilience—excellent bearing characteristics.
• Now used for original equipment in heavy-duty engines.
• Now available for replacement use.
Cyclan is exclusively a Sealed Power development
Write for "The Cyclan Story"
Sealed Power
PISTON RINGS · PISTONS
CYLINDER SLEEVES
SEALED POWER
CORPORATION
MUSKEGON, MICH.

highlights

- Pacific Intermountain Express recently added 20 GMC diesel-powered tractors to its fleet. These new units are powered by GM 6-71 engines which drive through twin Hydra-Matic transmissions.

- Drawbar pull for tractors is getting higher all the time. Right now we are waiting to see who will be the next "king of the hill". Rumor has it that a tractor boasting very nearly 70,000 drawbar pounds pull will be the next contender.

- At the OGP Conference in Washington governmental agencies sat down with industry to discuss engine specifications used for procurement. Apparently some good was done since we hear of visits to engine companies by government specification writers.

- It was recently reported that Gulf Interstate Gas Company will build an experimental unattended natural gas compressor station near Stanton, Kentucky. The station will be controlled by personnel at a station 80 miles away. The experimental station will be powered by a 3500-hp 4-cycle, turbocharged gas engine and will be on a stand-by basis for a 15-month test period.

- According to wind tunnel scientists at the University of Maryland, radical truck streamlining can produce fuel savings of about 30%. The wind tunnel scientists say it takes 58.3 hp to overcome wind resistance at 50 mph. Radical streamlining can reduce the 58.3 hp to 8.1 hp.

- It was recently predicted that the demand for home heating oil and diesel fuel will climb about 45% during the next five years. This was heard at the 40th annual convention of the National Association of Purchasing Agents. The speaker was Mr. Joseph J. Mulvey, petroleum consultant for Oil Advisors, Inc.

- During the first five months of 1955, Class I railroads placed 509 diesel-electric units in service. As of June 1, 1955 Class I railroads had 382 diesel-electric units on order as compared to 149 for the same date in 1954.

- Consolidated Diesel Electric Corp. of Stamford, Conn., has set up a branch in Ottawa. The branch will be known as the Consolidated Diesel Electric Corp. of Canada and will supply ground support equipment, aircraft component testing equipment and generator sets later when the Canadian factory is opened.

- Pennsylvania recently increased the weight limits on trucks from 45,000 lb to 60,000 lb. Perhaps this will give diesel-powered truck sales a boost in that state as well as ease the restrictions on through-truckers.

- At Kingman, Kansas, municipal power plant a 1000-kw, 6-cyl, supercharged Worthington diesel-electric set supplies the town with electricity. Back in 1905 however, water wheels were used to generate all the power for Kingman.

- ASLE and ASME will hold their second joint lubrication conference at the Antlers Hotel, Indianapolis, Ind., October 10, 11 & 12, 1955. There will be six sessions at which a total of 28 papers will be given.

- A bill recently introduced in the House provides for greatly stepped-up Federal highway construction spending . . . but before you sound off with the hurrahs —read on. There is a "sleeper" in this one. The bill would call for an increase in the gasoline tax from 2 cents to 3 cents per gal and the tax on diesel fuel from 2 cents to 6 *cents per gal.* Then there are a few other tax increases too. Can this be justified on a ton-mile basis?

Torque converter and quick-shift transmission permit FFD Euclid truck to haul heavier loads uphill with greater advantages. A dynamic brake attached to the converter reduces wear on service brakes while safely increasing downhill speeds.

Selecting and Applying Torque Converters

by ROBERT M. SCHAEFER, Engineering Manager, Transmissions Operation Allison Division, General Motors, Corporation.

Some selection and applicational ideas to help you plan the most effective combination of engine-converter power train components.

MODERN hydraulic torque converters, with their variety of arrangements and supplementary attachments, epitomize the word "flexibility". However, the broad selection of equipment available emphasizes the importance of selecting a converter that will give the most desirable output performance when matched to a given engine for a given application.

So there's the problem. And here is some criteria for its solution based on the use of Allison's single-stage hydraulic converter-coupling units. Principles of operation and constructional details have been described earlier (DIESEL POWER, May, 1955).

For selection purposes, applications may be grouped arbitrarily as industrial, automotive or a combination of both.

Generally, an industrial installation requires high starting torque and maximum horsepower in the lower speed range while an automotive installation needs low starting torque and maximum horsepower at the high speed ranges where greater efficiency may be obtained for economical performance. Combination industrial and automotive installations require a balance of horsepower over the entire speed range.

The following converter characteristics are usually associated with each application group:

Industrial—Has high stall torque ratio. Has an engine speed differential of about 10% which allows a high-level input horsepower, hence, more available horsepower at converter output shaft as it operates over its variable speed range. Engine governor cut-off speed point generally lies in converter range of the combination converter-coupling type of unit.

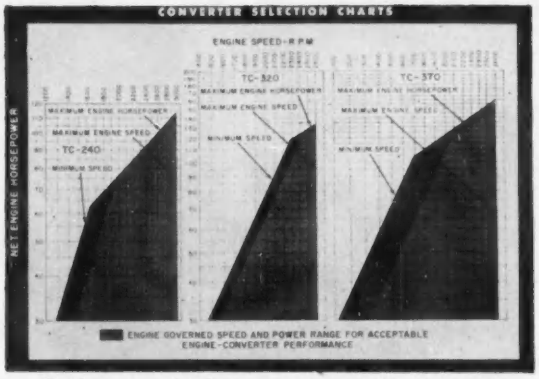
Automotive—Has low stall torque ratio. Has a rising speed curve that allows converter to reach coupling phase more rapidly and the speed differential is about 30%. Governor cut-off of engine generally occurs in the coupling phase.

Combination—May have either low or high stall torque ratio depending on applicational requirements. Engine differential speed runs between automotive and industrial or approximately 20%. Engine governor cut-off value usually occurs near coupling phase.

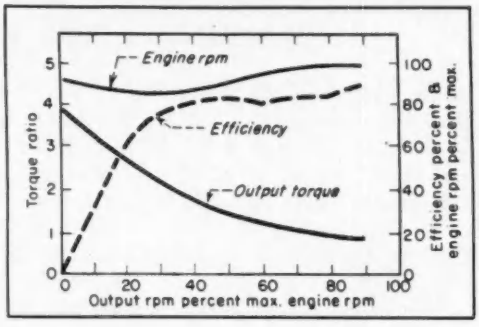
Each series Torqmatic converter is represented by a capacity and performance curve. These curves along with the engine performance curve are used in matching the engine to the converter to get the combined performance of the engine and converter operating together as a power unit.

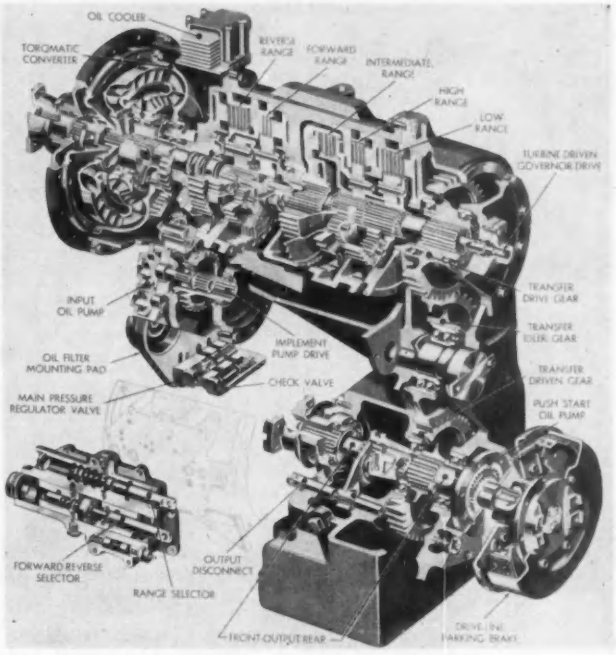
Other Drive Components Important Too

While torque converters provide broad operational flexibility, some load requirements demand still more. It is possible to tailor converters to meet some of these at the sacrifice of standardization. However, our experience shows the most practical and economic course is to combine the converter with other drive components.



Plotting net engine horsepower curve on this type chart, will show which converter model provides best balance between work cycle requirements and engine characteristics.





CRT-3330 Torqmatic transmission is a 3-in-1 package. Included are single-stage converter, "quick-shift" range gearing and transfer gearing drop box.

Typical curves illustrating approximate relation between output torque, engine rpm, and efficiency (left.)

Disconnect arrangements are a good example. Where complete isolation of the converter from the engine is required, permitting engine shutoff in multi-engine installations for example, an input disconnect clutch is required. A manually-operated standard dry-type clutch plate can be attached ahead of the converter.

Hydraulic disconnection of engine and converter is accomplished in the "dumping-type converter". A manually-operated control valve exhausts the oil from the converter. This arrangement has the advantage of not adding to the power packs overall length. It is used primarily in stationary equipment which requires occasional positive input disconnection.

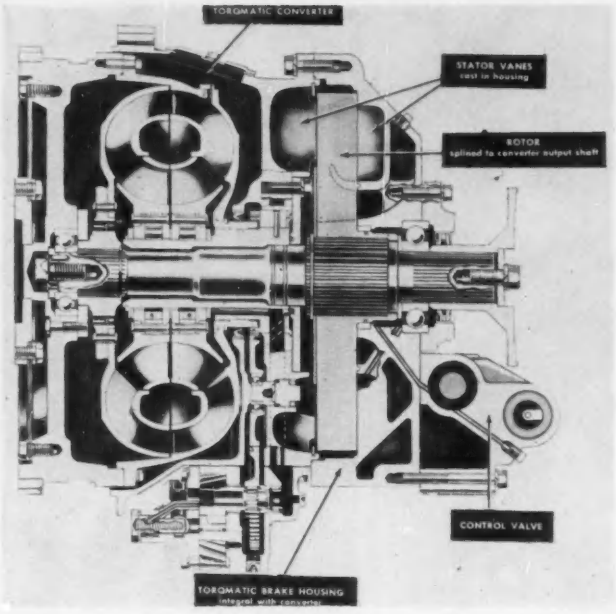
At the other extreme, a direct-drive lock-up clutch may be desirable to lock the converter out of converter-transmission power train. Located inside the flywheel, this clutch locks the converter pump to the turbine when engaged hydraulically through control valve operation. The clutch is designed to handle engine torque only and where full-load shifting is required, it is disengaged during gear change. Its greatest advantage is obtained where equipment runs for reasonable periods in a pre-selected range without requiring shifting.

Broader speed ranges are obtained by attachment of one of a number of Torqmatic transmissions. These may be of the planetary or counter-shaft type but in every case the gears are in constant mesh. Speed selection is quickly made by hydraulic actuation of brake bands or multiple-plate clutches without interruption of power transmission.

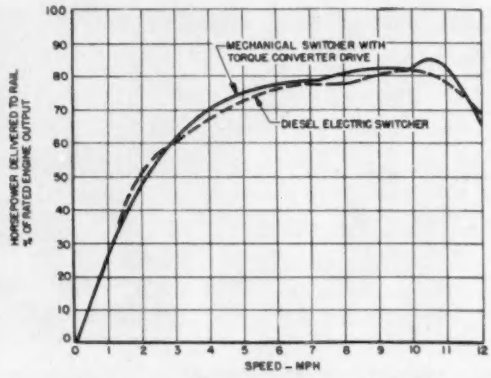
The latest of these, the CRT-3330, is illustrated. It was designed especially for industrial vehicles, (loaders, graders, forklift trucks, etc.) requiring forward and reverse operation in all speeds. It will be used with diesels and gasoline in the 70 to 130-hp class. This three-in-one package—converter, "quick-shift" range gearing, and transfer-gearing drop box—is a good example of the many possible ways to extend the flexibility of the already versatile converter.

It has a built-in drive for an implement pump. A quick cutoff valve is provided to disengage the transmission, making full power available for implement pump operation. There is also a disconnect clutch for the front output shaft. Note the accessory drive feature (driven from turbine) that can be used for a speedometer or more important to serve as a governor drive for controlling converter output shaft speed.

This particular unit includes a parking brake. Extending this idea of brakes, another type of application is the dynamic brake attached to converter units for braking heavy-duty trucks without wear on service brakes. A rotor on the output shaft, stator vanes cast in the housing, and a valve controlling flow of oil to and from the unit are the components. In downhill move-



Cutaway illustrating internal elements of combination torque converter and brake unit (left).



Solid-line curve shows, that over major portion of operating range, greater percentage of rated engine horsepower is available at wheels of diesel switcher with torque converter drive, than at wheels of diesel-electric switcher.

ment when the wheels are trying to over-run the engine, oil is admitted to the unit by operator control. Oil flow from the rotor is stopped by the stator with the result that considerable drag is exerted on the output shaft.

These examples serve to give an idea of the possible features and components that can be grouped to produce the desired result. Thus, in addition to selection of converter capacity and performance, we can select the particular features required for the application. Now, what are some of these applications?

Typical Converter Applications

Ten to fifteen years ago, torque converters were found in only a few applications such as oil field equipment, buses, and railcars. Most of these were in operation overseas. Since then the converter has proved itself in many applications and has gained wide acceptance as a power train component.

In the oil fields, multi-engine drive was made more practical by the power balance that could be obtained with torque converters installed between engine and load. This allowed increased power by combinations of mass production engines and increased rig versatility.

The economic application of torque converter drives to transit coaches is well established by millions of competitive service miles. Operational safety, smoothness and simplicity of single-throttle controlled automatic drives have paid large dividends to both operators and passengers.

Railcar builders faced the major problem of accelerating railcars heavy enough for constant railroad use with high-speed engines as a source of power. No mechanical clutch even today would take the tremendous loads without considerable slipping. Also, mechanical drives lack flexibility, especially for remote controls.

Electrical drives are very satisfactory but add weight and cost while reducing fuel mileage. Fortunately, the torque converter produces the same type of starting characteristics as an electric drive at a higher efficiency over the normal operating range. Weight and cost are lower. It combines the efficiency of the mechanical transmission with the smoothness and simplicity of the electrical unit.

This is all accomplished without speed-stepped gears, without hand or automatic control, or without slipping a mechanical clutch. Out of the principles of these original applications—*multiple-engine installation, ease of control* and *smooth application of power* for starting the load many new applications have grown. Applications utilizing each advantage are listed.

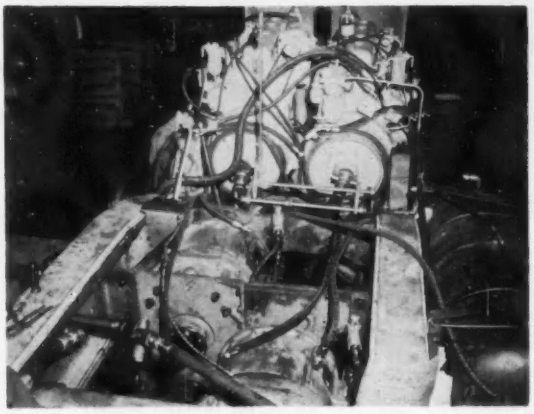
Multiple-Engine Principle

Dump Trucks—Many operators using bottom dump trucks have found the roads where these trucks work practically impassable even with the use of pusher tractors. As one example, mud was so deep at one loading point that the tractor pushers were in as much difficulty as the vehicles they were supposed to help.

To overcome this condition, a second engine driving the trailer wheels was used to eliminate the tractor pusher and cut costs per yard moved. Both engines were equipped with torque converter drives so as to effect a proper power balance between both ends of the vehicle.

This same principle has been applied to twin-engine rear dump trucks carrying 34-, 50-, and 60-ton payloads. By compounding production engines with torque converters it has been possible to increase the power and decrease the cost per yard by doing more work. Ease of operation and control by the driver have resulted in greater man-hours of work without accidents. Elimination of mechanical clutches has led to lower maintenance costs and longer service life of the power train components.

Scrapers—These principles were also applied to con-



Twin-engine, torque converter-transmission drives on FFD Euclid have advantage of automatic power division. Separate transmissions improve installational flexibility.

ventional scrapers where it was necessary to use a tractor pusher when loading. With the extra engine operating in tandem with the front engine this vehicle became self-loading for the first time.

Smooth Application of Power

This principle applies equally to all torque converter installations where smooth pick-up of the load and reduction in shifting is desired because of high load variation. In many applications this factor alone has affected savings in maintenance and tire costs, and has more than compensated for the extra initial cost. Some of the vehicles benefiting from reduction of shock loads are coal haulers, logging trucks and towing tractors.

Shovel Loaders—Torque multiplication at stall with high power factor, rapid acceleration, smooth start, response to load variation—are all features obtained by torque converter use in this type of application. The entire industry is swinging to torque converters.

The work cycle is a natural for the torque converter—crowd into bank while loading, quick reverse and swing for turn and complete turn, then haul and dump. The next part of cycle is quick reverse and swing for turn, quick forward, and complete turn back to load.

Ease of Operation and Control

Cranes and Shovels—Setting steel with a crane requires ease of operation and control. Characteristics of the converter allow the operator to drop or raise the load merely by using his engine throttle. Fluid power application prevents shocks and provides inching control thus saving construction costs.

Many torque converter applications require constant output speed for varying load conditions. A converter with a tailshaft governor connected to the engine throttle provides an ideal control for this type of application. The operator merely controls the setting of the governor to the output speed condition required and the governor controls the engine throttle to keep the output shaft speed constant. As loads increase and decrease, the added throttle plus torque multiplication allows a wide range of power in a simple package.

This control is used in power shovel applications. The converter serves as an infinitely geared transmission, giving added torque during the crowd or load cycle, and operating at peak efficiency during the balance of the swing and dump periods.

Road Rollers—This heavy machine must reverse its direction as quickly as possible without roll-slip, or dwell, at the end of each pass. All of these machines were overpowered because the operator had no time to do any gear shifting other than reverse. However, the converter with its fluid multiplication provides the automatic torque ratios needed, permitting use of smaller engines which reduced fuel consumption.

Other advantages gained are that roll-slippage is substantially reduced, equipment life increased by reduced shock loading, direction of travel can be reversed more rapidly, more work done per unit of time. With tailshaft governor, a wider range of controlled constant speed is obtained.

Graders—Here again the tailshaft governor feature brought out the advantages of converter use in road graders. It is possible to provide a broad effective speed range thus reducing speed ratios and consequent shifting. Also, better speed control of the grader and more work per unit of fuel and time is obtained by keeping the engine at the most economical speed and throttle setting.

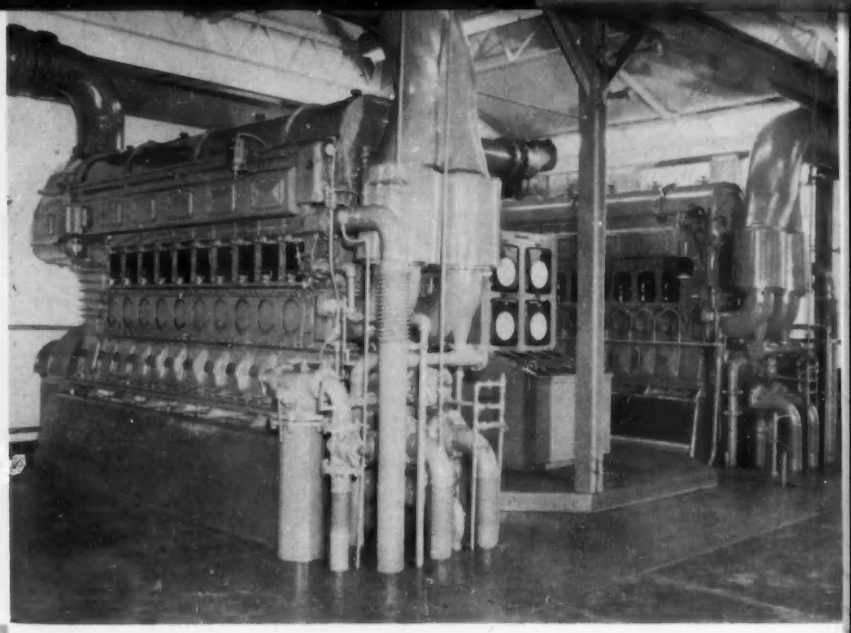
Brand New Possibilities

In all of these applications we can see how great improvements have been made, operationally and economically, in conventional equipment and machinery through application of torque converters. In addition, knotty problems that have held up development of new items have been solved and whole new fields have been opened up.

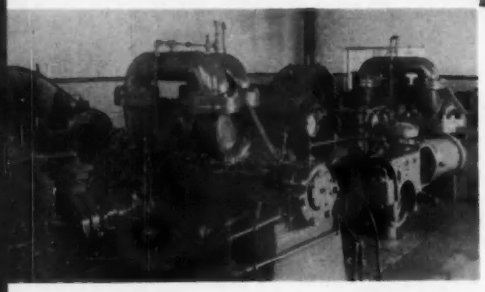
As an illustration of this, during the past year a completely new technique of hydro-fracturing has developed in the oil fields. Its purpose is to increase production of wells that are tapering off and to rejuvenate wells that have stopped producing completely.

The process starts by pumping the well full of a mixture of oil and controlled grain-size sand. The next step is application of high pressures until the strata around the casing is fractured. Then, the oil-sand mixture is forced into fissures and keeps opening up the fracture until the oil bearing pocket is reached.

Torque converter characteristics are ideal for handling this process. Pumping is started in high gear. Then a down-shift without interrupting flow is made as the pressure increases. Slowly and smoothly, pressure is built up without shock loads to the equipment and the converter automatically provides increased torque to the pump without lugging or stalling engine. Finally the transmission is up-shifted to maintain high rate of flow and extend the fracture.



Engine installation ot Wewahitchka, Fla., pumping station. Driving centrifugal pumps as seen below (Newton, Ga., station) through speed-increasers, the O-P's in the three new stations handled 63,719,187 bbl of petroleum products using an average of 0.37 lb of fuel per horsepower hour.



O-P'S in Pipeline Service

A 56-month operating report on six F-M 1600-hp opposed-piston engines operating in three pumping stations for the Southeastern Pipe Line Company.

A LITTLE over five years ago, Southeastern Pipe Line installed six, 1600-hp Fairbanks-Morse O-P engines. They were installed in three pumping stations and increased line through-put by 36%. A recent report shows the stations concerned were pumping more than 97% of the time in the 56 months since the diesels were placed in operation. During that period, the new engines supplied power at an average fuel consumption rate of .37 lb per hp hr.

Some Figures

The three newest diesel pumping stations are located at Wewahitchka, Fla., River Junction, Fla., and Newton, Ga. Of pre-fabricated steel construction and measuring 80 ft by 40 ft, they are designed for one-man operation, as are all 14 stations in the system. Each is equipped with two Model 38D8⅛, 10-cyl, 8⅛-in by 10-in, Fairbanks-Morse opposed-piston diesel engines, rated 1600 hp at 720 rpm and driving 6-stage, flooded-suction, centrifugal pumps, equipped with 11⅜-in impellers and rated 1310 gpm at a discharge pressure of 1200 psig. The driving arrangement for each pump includes a through-bulkhead shaft, flexible coupling, and a speed-increasing gear of 1 to 6.583 ratio which steps engine speed of 575 rpm up to 3785 rpm at the pump.

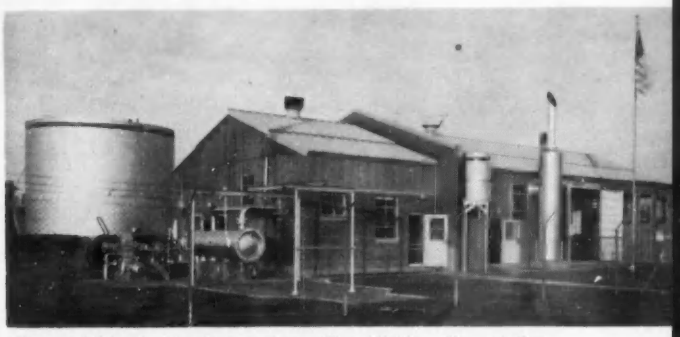
The two 1600-hp O-Ps at each station are operated alternately, each having sufficient power to handle the station's average flow of 1650 bbl per hr. This arrangement provides each station with 100% standby capacity under normal conditions.

The three stations went into operation on January 1, 1950 and since that time have been pumping products on a 24-hour, around-the-clock basis. In their first 56 months of service they were actually pumping products 39,286 hr, 39,367 hr, and 40,430 hr respectively, out of a possible total of 40,896 hr, handling a volume of 63,719,187 bbl of products. Despite the fact that they are operated at an average load of from 800 to 850 hp, the average fuel consumption of the six O-P diesels throughout this period was an estimated .37 lb of fuel per hp hr.

This average is an approximation, due to the fact that no meters are installed to measure the exact flow of fuel to each engine. In addition to the two O-Ps, there is installed at each station a 150-hp, 1200-rpm diesel engine, driving a 50-kw, 3-phase, 60-cycle alternator, which supplies power for the motor-driven auxiliaries

and for lighting purposes. All three diesels draw fuel from the same 5000-bbl (42 gals per bbl) storage tank and the only available means of measuring fuel consumption is a conventional sounding device. The result is that the .37 lb per hp hr figure represents the average fuel consumption for all six O-Ps and for all three diesel-generator sets combined.

Between January 1, 1954, and September 1, 1954, the two O-Ps at Newton, Ga., were in operation for 4779 hr out of a possible total of 5832 hr. Their average load during this period was 800 hp, representing a total of 3,893,070 hp hr. The 50-kw diesel-generator set, meanwhile, was in operation for 4882 hr at an average load of 35 hp, representing 169,870 hp hr. Total fuel consumption for these three engines for the 8-mo period was 204,360 gal. At an average weight of 7.2 lb per gal, this represents an average fuel consumption for the entire station of .377 lb per hp hr.



Three additional pumping stations (Wewahitchka, Fla., station is shown) increased daily through-put by 28,000 to 38,000 bbl.

During the same period, the two O-Ps at River Junction, Fla., carried an average load of 830 hp for 4854 hr, representing a total of 4,028,820 hp hr. The diesel-generator set averaged 35 hp for 5045 hours, representing 176,585 hp hr. Total fuel consumption at this station was 216,093 gal, an average of .369 lb per hp hr.

At the Wewahitchka station, the two opposed-piston diesels averaged a 850-hp load for 4868 hr and the diesel-generator set 35 hp for 5812 hr, representing a combined total of 4,341,220 hp hr. Fuel totaling 220,395 gal was consumed at an average rate of .365 lb per hp hr.

The three stations combined were in operation during this period for a total of 12,439,695 hp hr, consuming 640,848 gal of fuel at an average of .370 lb per hp hr.

Operation

Petroleum products enter each of the stations at an average pressure of 100 psi, passing through pneumatic plug valves, which are controlled from the station's gauge panel by 150 psi air. These valves are so arranged that the main-line flow can be bypassed around the pumps when necessary. Before reaching the pumps, the products flow through a "hay" tank, where impurities are removed through a shredded-wood filter and then into a wet well. Pumps discharge at a pressure of 1150 psi through another set of plug valves into the main line.

A compact meter board installed between the two O-P engines at each station provides a continuous record of pressures and volume of flow. Twenty-four-hour recording meters chart the pressure differential before and after the hay tank, the station flow, the station suction and discharge, and the pump suction and discharge.

Fuel for all diesel engines is sent through the main line and is drawn off at each of the three O-P powered stations into a 5000 bbl storage tank. It is then sent through, or bypassed around, a fuel oil centrifuge to a single 2200-gal day tank by a 50-gpm rotary pump, driven through 4.15 to 1 reduction gears by a 2-hp, 1715 rpm motor. From this day tank the fuel flows by gravity to each engine, passing through a duplex filter before reaching the engine-driven supply pump on each O-P.

In order to facilitate one-man operation of each pumping station, automatic controls and safety devices have been included wherever possible. All pumps are protected against low inlet and high outlet pressures, hot pump casings, excessive pump bearing temperatures and low or excessive flow. All electric motors are protected against excessive bearing temperatures and all diesel engines are protected against low lube oil pressure and high jacket water temperature.

A high detergent lube oil is stored at each of the new stations in a 2200-gal tank. Lube is transferred to the crankcase of each O-P by a 50-gpm motor-driven pump similar to the fuel oil transfer pump. It is circulated un-

der pressure by an engine-driven pump, passing from the engine through a strut-tube type cooler, a full-flow strainer, and then back to the crankcase.

A bypass line from the pressure side of the engine-driven circulating pump carries a continuous flow of lube through a separately mounted cartridge-type filter for added protection. Lube oil periodically drained from each crankcase is stored in a 570-gal storage tank before being run through a centrifuge by the 50-gpm transfer pump. It is then sent to a 570-gal clean oil storage tank.

Soft, fresh water, to which a rust inhibitor is added, is drawn from a deep well at each station and is circulated through the cylinder jackets and to the pistons by an engine-driven pump. It passes from the engine to the strut-tube lube oil cooler where it acts as a coolant, and then to a forced-draft evaporative cooler located at the rear of the station. A small by-pass from the pressure-side of the circulating pump sends a continuous flow of jacket water to the lube oil coolers installed on each speed-increasing gear.

Starting air is supplied at a pressure of 250 psi by a 2-stage, 4¼-in x 1¾-in x 3-in air compressor, driven by a 7½-hp, 1750-rpm motor. Compressed air for this and other purposes is stored in four storage bottles.

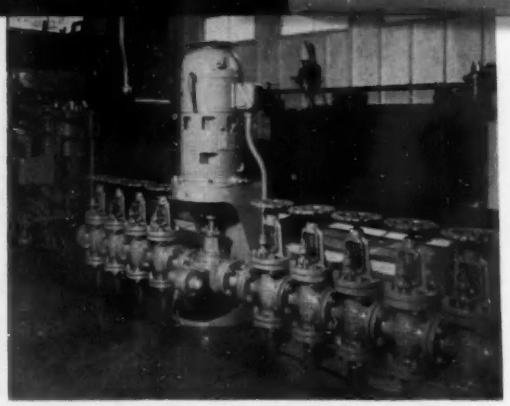
Scavenging air is drawn from the outside through an oil-bath type filter. It is sent to each cylinder by a positive-displacement blower, driven off the upper crankshaft. Exhaust gases are expelled through vertical snubbers, one mounted at the front and one at the rear of the building.

Summing Up

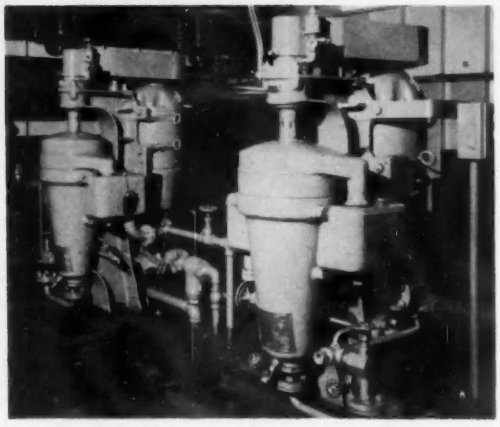
With this equipment, installed at its three newest diesel-powered stations, the Southeastern Pipe Line Co. is pumping a maximum flow of petroleum products through its 483-mi system in an attempt to feed the South's booming industry and population. Working around the clock, the six new O-Ps have taken up whatever room for expansion remained in the system and are contributing high efficiency and dependability to SPL's all-out efforts to keep the South growing.

Principal Equipment

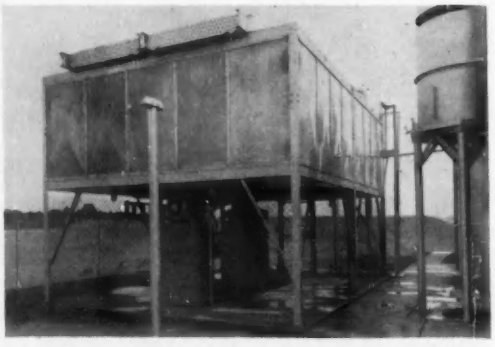
Main engines	Fairbanks, Morse & Co.
Main pumps	Worthington Corp.
Speed-increasing gears	Worthington Corp.
Fuel oil filters	Commercial Filter Corp.
Centrifuges	Sharples Corp.
Transfer pumps	Blackmer Pump Co., Inc.
Lube oil cooler	Harrison Heater Div., Gen'l Motors Corp.
Lube oil strainer & filter	Purolator Products, Inc.
Main Line plug valves	Nordstrom
Air filters	Continental Air Filters, Inc.
Exhaust snubbers	Burgess-Manning Corp.
Gauge panel	Westinghouse Electric Corp.
Jacket water cooler	Fluor Corp.
Air compressor	Worthington Corp.
Diesel (driving generator)	Cummins Engine Co., Inc.
Generator	Electric Machinery Mfg. Co.
Switchboard	Westinghouse Electric Corp.
Fire pump	Hale



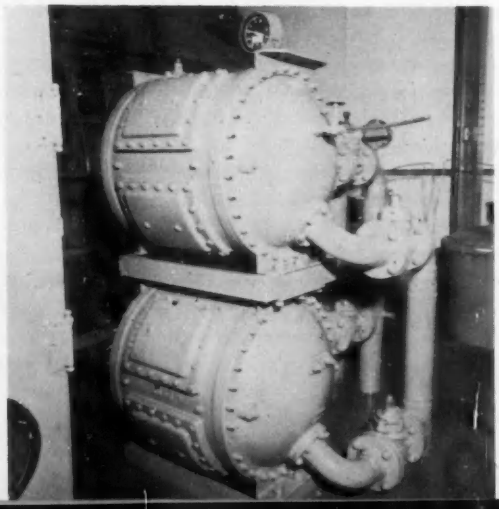
Dirty, cleaned and new oil are transferred between engines and tanks by 50-gpm pump as selected by setting valves.

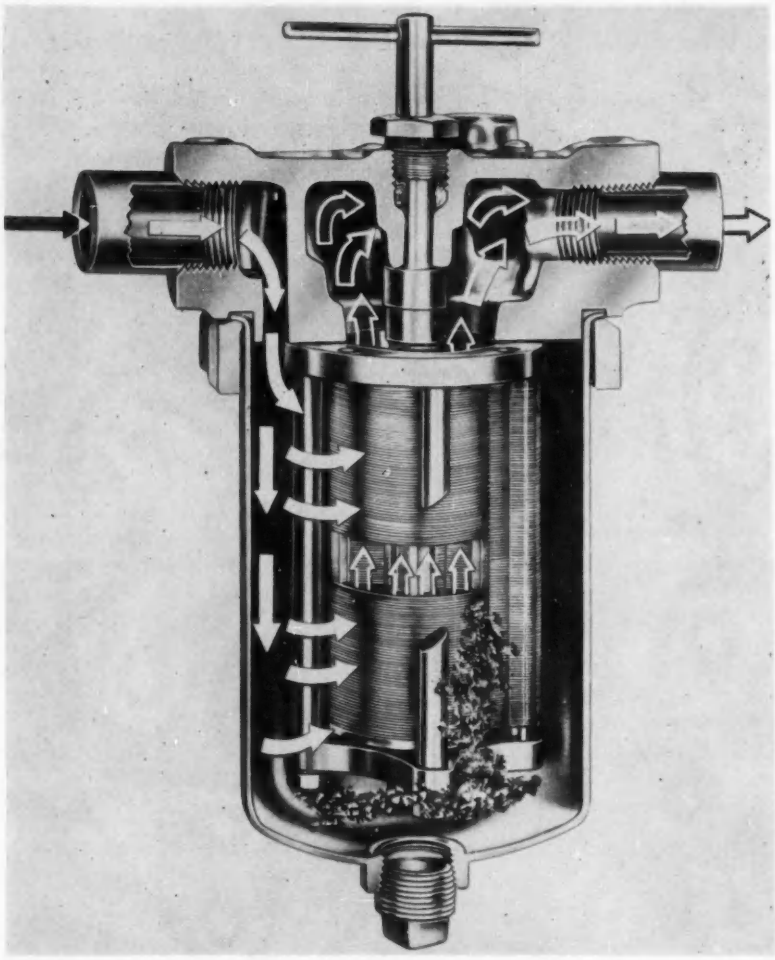


Centrifuges for lube oil (foreground) and fuel purification are available at each of the three similar stations.



Speed-increaser oil and engine lube oil (coolers below) is cooled by jacket water that is then cooled in forced-draft cooler shown. Oil-bath air cleaner is at right.





Full cutaway of the micronic strainer showing construction and flow. Disc design provides for removal of dirt particles down to 37 microns.

More Efficient Precleaning Cuts Filter Costs

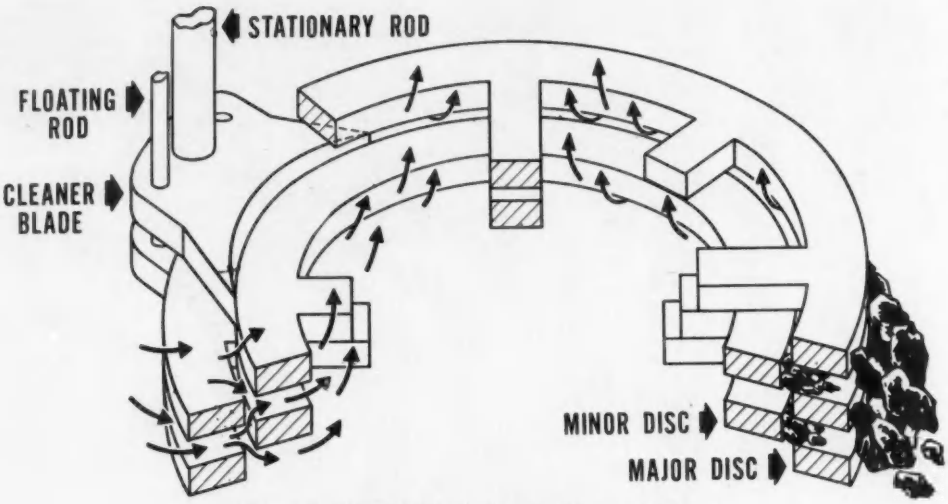
Effective removal of particles in the micronic-size range by an automatically-cleaned micronic strainer increases secondary filter life while affording greater engine protection.

FUEL and lube oil filtration systems in modern engines generally represent a practical compromise between cleaning efficiency and cost factors. Individual components available for incorporation in a system will not only affect efficiency but can revise the concept and hence the design of the systems. As a case in point, the Cuno Engineering Corporation has announced a new edge-type micronic strainer (its cleaning capabilities warrant the term "filter") that enables a new look to be taken at current filtering system designs.

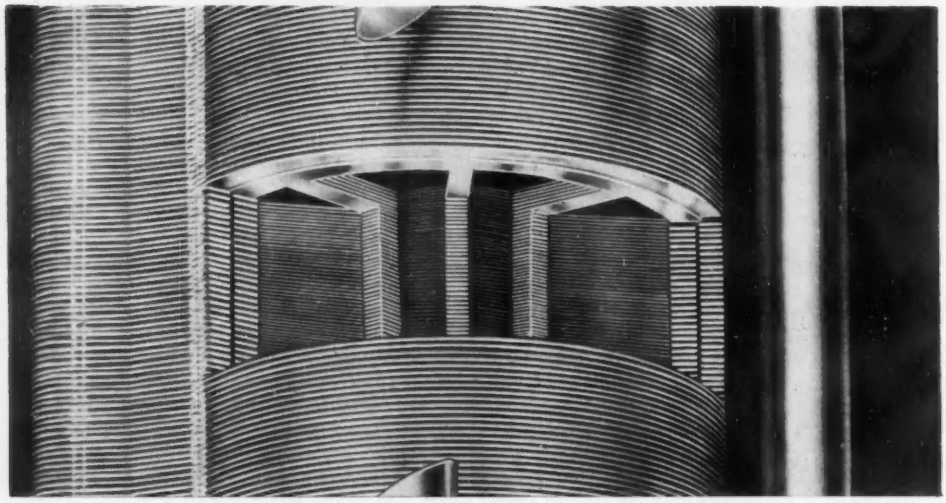
This new micronic strainer is an edge-type unit designed primarily for the diesel industry. It will remove all dirt particles 37 microns and larger and can be cleaned simply by turning a handle. With this degree of precleaning, the load on secondary filters is greatly reduced, their life lengthened, and a new evaluation of the factors affecting system design is made possible.

Filtering Systems

Fuel systems must necessarily be of the full-flow type to insure cleaning of all fuel delivered to injection equipment. Strainers are a commonsense precaution that should be followed by micronic filtration down to the smallest practical size. A primary filter followed by



Accuracy of Major disc ID and minor disc OD controls fineness of filtration. Note "wedge" action of cleaner blades.



Cutout of element showing relationship of major disc, minor disc, and cleaner blades as in drawing above.

a final-type unit is not uncommon. Regardless of the system used, the increased effectiveness of the new micronic strainer unit will greatly relieve the dirt load on the next filter in line.

Lube oil filtration systems generally fit into one of three categories—*bypass*, *shunt*, or *full-flow*. Strainers have a place in each type of system. In all cases they are installed to handle the full flow and in this way provide full-flow engine protection up to their capabilities, regardless of the system design.

By themselves, even the finest of strainers cannot remove the micronic particles down to the size needed to protect today's close-fitting parts. While the actual micronic particle size that is harmful depends on engine size, lubrication system design, and even opinion, the current trend is toward removal of particles down to at least 10 micron size.

In bypass systems, a portion of the oil circulated is bled through the filter back to the engine sump. A micronic-type strainer in the system will relieve the dirt load on the bypass micronic cartridge, but more important, will offer protection to the engine by cleaning the bulk of the circulating oil flow.

Shunt systems differ mainly from bypass types in the percentage of oil filtered on each pass and the disposition of the cleaned oil. Filtered oil joins the remainder of the flow after the filter rather than returning to the sump. Since there is no pressure bleed-off as in the case of the bypass filter, a larger portion of the oil can be filtered. Then too, this cleaned oil goes right to the lubricated parts along with the remainder of the flow. The strainer in the system does the same basic job as in the case of the bypass method.

Full-flow filtration is generally conceded to be the

most desirable. Since the entire flow is cleaned on each pass, a large amount of filter surface area is necessary if micronic filtration is to be obtained while holding pressure drops through the filter to reasonable limits.

Many such installations incorporate a bypass relief valve to insure oil to the engine during periods of high pressure drop due to cold oil, plugged filters, etc. Full-flow strainers in the main flow afford protection during such bypass periods. In systems designed for cartridge changes with the engine running, this strainer protection is very important.

Objections to full flow filtration have been high first cost and replacement costs of filter elements. The strainer in the system will significantly increase element life, thus reducing the major long-range cost factor.

A New Look Possible

In all these applications, the results obtained through the use of strainers will largely depend upon their capabilities with respect to sizes of particles removed. Filter concerns the world over have been aware of this and the first steps toward significant improvement were those taken in Europe some years ago. These developments resulted in a cleanable micronic strainer that has since become standard equipment for many English and European engines. After seeing the effectiveness of this approach, Cuno spent several years developing an improved design specifically for the American market.

Cuno points to the following capabilities and advantages:

1. Removal of all particles 37 microns and larger plus varying percentages of smaller particles as dirt accumulates.
2. It is permanent, requires no cartridge changes, and can be cleaned by simply turning a handle. On large units, a motor drive makes it a self-cleaning unit.
3. It has high flow rates for the space it occupies.
4. Its low pressure drop requires less pumping horsepower.
5. Its all metal construction prevents absorption or adsorption of oil additives.
6. It has a low initial cost.
7. It can be built into the engine.

With these advantages, engine designers and users may want to take another critical look at the concepts that influenced their selection of a filter system.

The New Micronic Strainer

Cuno's new filter is called the Super Auto-Klean as certain construction features are similar to the well known Auto-Klean. Basically, the cartridge is composed of three metal parts—a major disc, a minor disc, and a cleaner blade. The discs are stacked alternately on a movable splined shaft while the cleaner blades are stacked on a stationary cleaner blade rod and fit into the space between major discs.

As seen from the cross-sectional drawing, the filter opening is created by the difference in diameters between the ID of the major disc and the OD of the minor disc. This opening may be varied—the minimum being 40 microns (actually 37 microns), the next standard opening 75 microns (0.003-in), and the maximum 0.005-in. Since the thickness of the minor disc is 0.012-in, it may be noted that there is actually a second (or primary) filter since particles 0.012-in and larger will be prevented from entering the space between the major discs. This 2-stage filtration accounts for the filter's ability to handle dirt loads of varying characteristics without undue stress or "loading" of the cartridge.

Higher flow rates than the standard Auto-Klean are possible because of the shape of the restriction. In the Super Auto-Klean, the restriction to flow is only momentary as the oil (fluid) passes the corners of the major and minor discs.

Cleaning is accomplished by rotating the disc stack. The stationary cleaner blades "dig" in because of the plow-shaped point and bear against the minor disc. Dirt particles that build up on the inlet side of the filter opening are "plowed" or "combed" out by the blade. These particles are forced out of the space by the accumulation of others and finally as they reach the OD of the major disc, fall away from the cartridge and settle to the bottom of the filter housing. At convenient periods, the housing may be drained to remove the accumulation of dirt.

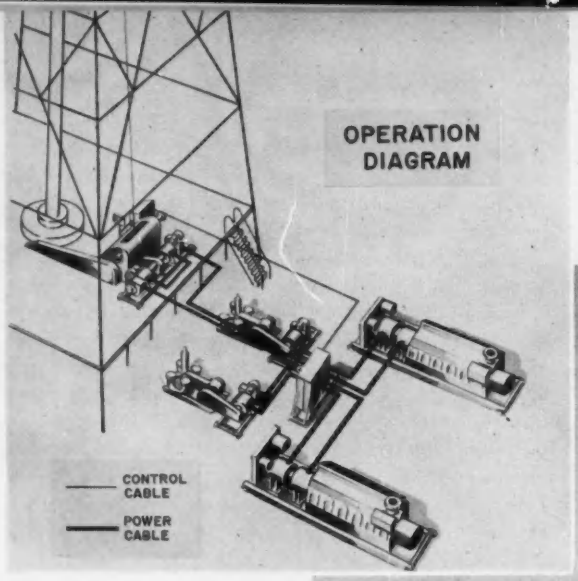
An interesting feature of the cleaner blade assembly is its ability to pivot around the main cleaner rod. All cleaner blades are "tied" together by means of a "floating" auxiliary cleaner rod. Its function is to prevent a single blade from "digging" in too far and to allow for uniform pressure of the cleaner blades. Actually, the stack of cleaner blades "rock" in unison as direction of rotation is changed.

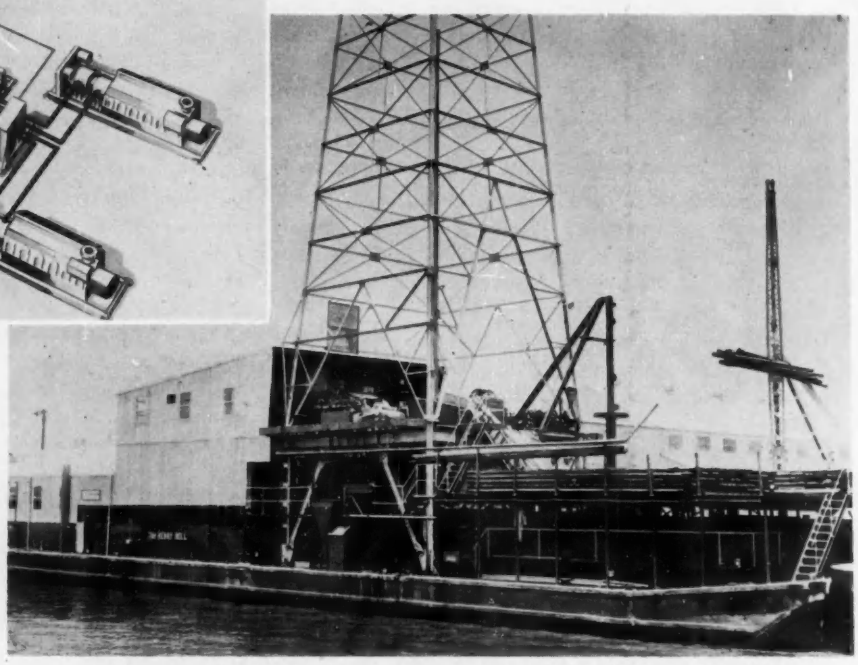
Flow Rates

Cartridges are of approximately 2¼-in diameter and are made in two lengths—5-in and 8-in. Designed to be interchangeable with standard cartridges already in use, they may be used in current housing designs. The cartridge is made of carbon steel or Type 316 stainless steel.

Flow curves for an 8-in cartridge with 40-micron (actually 37 microns) filtration based on clean fluid flow at a 3-psi pressure drop, show that a single cartridge will handle almost 25 gpm of lube oil at 200 SSU. Thus, a 4-cartridge, inline housing will handle 100 gpm of 200 SSU oil at a pressure drop of only 3 psi. If a slightly higher pressure drop is permissible, this same unit could handle up to 175 gpm of 200 SSU oil.

For lower flow rates, a 5-in cartridge is available; and for fuel and special applications, the cartridge can be built in smaller lengths. It is important to note that the low pressure drop created by the Super Auto-Klean means less pumping horsepower is consumed in the process of providing more effective, more easily serviced, and lower cost filtration.





Primary power for off-shore drilling rig on barge "The Henry Bell", owned by the Bateman Drilling Co., is furnished by two Alco diesels, adaptable for dual-fuel operation.

Diesel-Electric Drive Powers Drill Rig

Flexibility of control and operation, portability, and diesel reliability and economy all come in power packages built for the drilling industry. New Alco unit goes to Bateman Drilling Co. of New Orleans.

LOOK what diesel-electric drive did for the railroads. Flexibility of control and operation, and economy were two of the principle reasons for the rapid conversion from steam to diesel power. Diesel electric drive proved to be an effective method of producing and applying power.

Now, those same principles are being applied to oil well drilling rigs. In fact, not only the principles but some of the same type equipment found in today's modern diesel-electric locomotives is being used in the portable power units for the oil drilling industry.

To produce it's portable power package, Alco Products has designed a number of skid-mounted components and integrated them for operation as a unit. This adds physical flexibility. It permits use of the required number of components while not restricting their placement at the site, except for the mud pump and draw works motors, which must be placed with respect to the driven items.

One result is more efficient space utilization. For offshore rigs, the components can be placed so as to provide proper weight distribution.

Diesel-electric drive provides operational flexibility. Speed-torque ratios are automatically controlled with only two transitions, as opposed to the many ratio transitions necessary with mechanical rigs, either diesel- or steam-powered and equipped with compounds or transmissions. This feature is designed to provide smooth power to the draw works or pumps, regardless of work load requirements.

In all, the power package consists of two diesel-electric generating sets, two main control cabinets, two draw works motors, two mud pump motors, one driller's control console and one driller's instrument panel. All of these components are skid-mounted, so that they can be transported easily from one site to another.

The engines powering the rig are 6-cyl 4-cycle, 9-in by 10½-in, Model 251 Alco's. They are turbocharged to provide 800 hp at 900 rpm. Aftercooling is also provided. Direct-connected to each engine are two 250-v, separately excited generators mounted on a common shaft. One generator of each set delivers 500 hp to draw works and the other generator delivers 600 hp to a mud pump.

Generators are differentially compounded to prevent overloading of the engines and limit armature currents to reasonable values. Each engine set also includes a 50-kw, 125-v auxiliary generator for lighting and power loads, as well as a 3-kw exciter for each of the main generators.

Both 500-hp draw works motors are mounted in tandem on a common skid and are connected to the drive shaft with two flexible gear-type couplings.

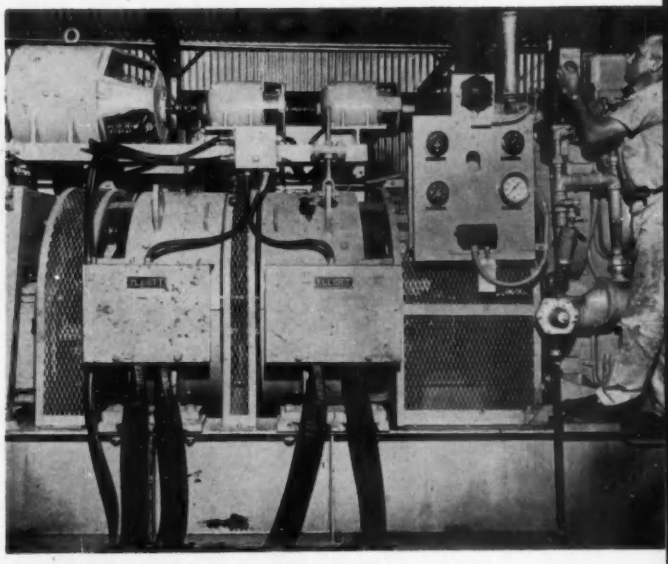
Motor control is by a handwheel operated rheostat in the drillers control stand. There are 30 hoist positions, 15 lowering positions and a neutral position. Selections of motor power combinations are made by a 4-way switch on the control stand.

For flexibility of set-up, mud-pump motors are skid-mounted separately. Like the draw works motors, they are connected to drive shafts with flexible gear-type couplings.

Power from motor drive shafts is transmitted to respective draw works or mud-pumps mechanically, according to drive design for the driven units. This will permit the repowering of rigs by simply matching capacity, and the drive, whether it be vee-belt, chain, or some other.

Control panels were built in Alco's locomotive electrical shop, and the generators and motors were supplied by the Elliott Company. Future power packages of this type will be available with similar equipment or with transportation-type electrical gear for even greater economy. Engines will be available for this type application ranging from 550-to 2400 hp and capable of powering rigs to drilling depths of 20,000 ft, according to the manufacturer.

One of the two 6 cyl, 4 cycle, Model 251, 800 hp, turbocharged diesels powering "The Henry Bell". At left is skid mounted control cabinet.

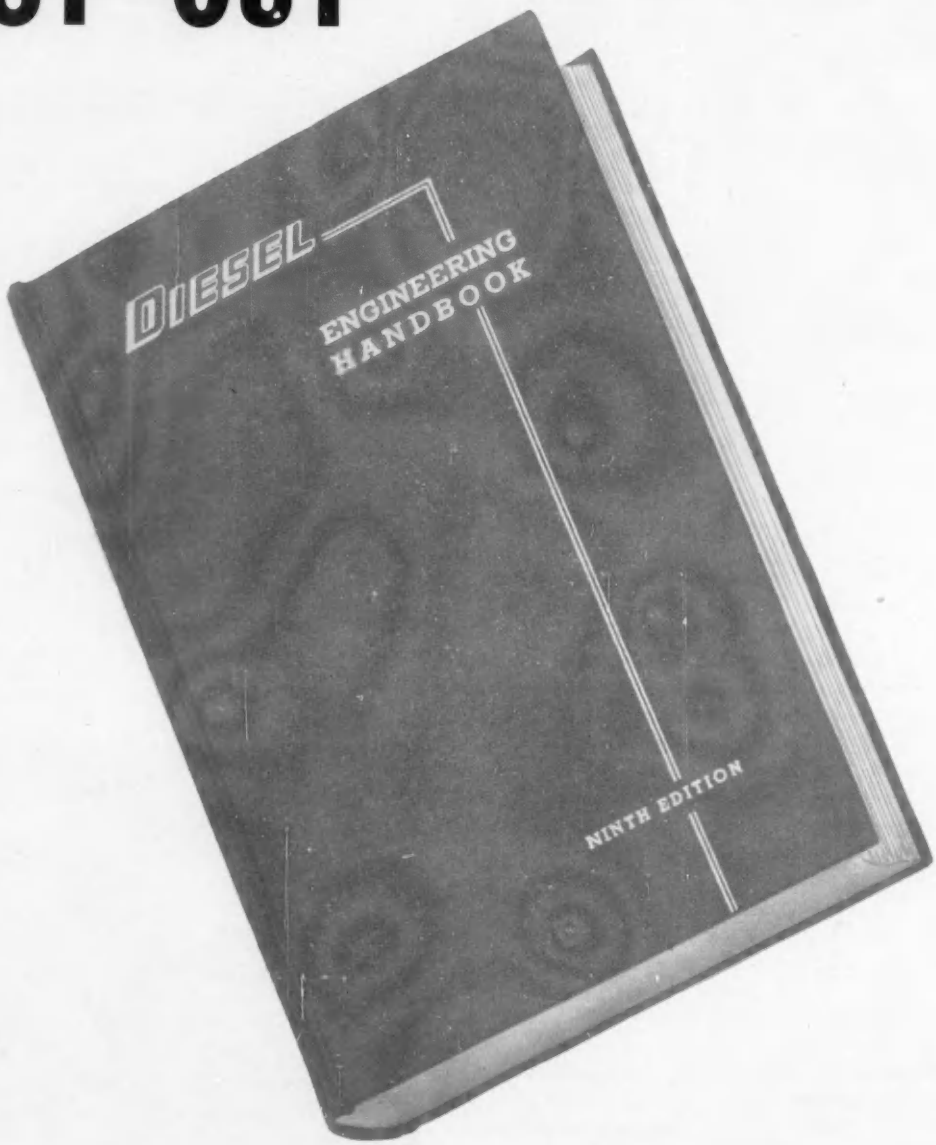


Close-up of 500-kw and 400-kw direct-driven alternators on a common shaft with individual belted exciters, 50-kw belted auxiliary dc generator and engine gauge and alarm panel.

C. S. (Scotty) Scott of Bateman Drilling Co. at driller's control console which includes exciter rheostats for speed regulation of main motors through alternator voltage control and reversing switches which contain 30 hoist and 15 lowering positions. One of the two draw works motors is seen at left.

NOW BIGGER THAN EVER BEFORE --

JUST OUT



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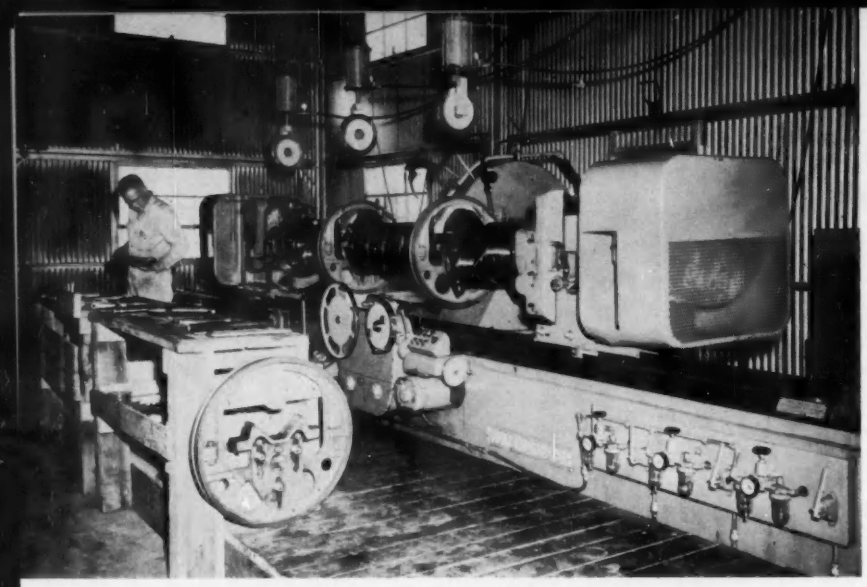


Large Van Norman grinder with 36-in swing can take 15-ft diesel crankshaft. Pneumatic overhead compensators take the sag out of a heavy shaft, enabling grinding to within 0.0005-in tolerances.

Chromium for Crankshafts

Chromium-plated crankshafts are gaining greater acceptance daily. What are the advantages for you and what should you know to insure that you are getting a good job? One of the pioneers in this field supplies some answers.

WHERE can chromium plating be used in your engines? Actually, you can use it on most moving parts from crankshafts to valve stems, from camshaft journals to pump shafts, from cylinder liners to piston rings and pins. When properly applied—both from the processing and economic points of view—it has proved of inestimable value to the life and performance of the engine.

Better performance with less operating cost and maintenance expense is a powerful economic incentive for its use. Chromium plating does not have to be defended any more. It has proven its value wherever its use is feasible and needed. Railroad, stationary and marine diesels are using it. The U. S. Air Force is using it in aircraft engines on both cylinders and crankshafts; also the other services, particularly the Navy, are alert to its many advantages.

Volumes could be written on the three general categories of chromium plate in use—ornamental, porous or channel, and hard or industrial plating. Each category has its own varied and complicated processes. Some platers find it desirable to specialize on certain jobs in one branch of this field. Thus they serve industry better by rendering a service more or less neglected by the general run of chromium platers.

Such is the case with the Lane Plating Works in Dallas, Texas. In his 30 years in business, Mr. Lane has plated hard chromium for more than 25 years, qualifying him as one of the "pioneers in chromium plating" in this country. With the exception of two years of heavy industrial nickel plating for the AEC, the principal business was general industrial hard chromium plating and grinding.

After surveying the United States in 1949 to ascertain the situation with respect to chromium plating of crankshafts, Mr. Lane decided to specialize in this field. This survey showed very few platers with experience or interest in doing this highly technical work. It also showed a very definite need for this service and ample room for improvement in the various processes and techniques being used.

Mr. Lane's business had outgrown three locations and so in 1950, the partnership (Mr. Lane's sons had entered the firm after World War II) built a new and modern building. When decision was made to specialize in chromium plating crankshafts, the plant was completely equipped for the job making full use of modern equipment and processes. They have processed hundreds of shafts from large truck size to and including railroad diesel engine crankshafts. Military aircraft crankshafts and propeller shafts that have been processed run into the thousands.

Before getting into details of the equipment and processes used, let's answer the question. . . .

What Has Chromium Got?

Chromium is a most exceptional metal. It stands apart and alone in that it has so many exclusive properties not found in any other one metal. Chromium has extreme hardness; is practically frictionless; is alkali-proof; practically acid-proof; is non-galling; has good heat conductivity; has an extremely high melting point; has extreme resistance to wear; will not contaminate other liquids or solids; yields to smooth or porous finishes; is platable and will adhere on practically all metals; and is the most trouble-free, smoothest operating and longest wearing commercially-plated metal known. Characteristics that pertain to usage for engine component plating are given in tabular form.

Relating these to problems arising in engine performance it can be seen they offer practical solutions. Hardness, corrosion resistance and frictional characteristics, for example, indicate that chromium plating provides an excellent surface for journals. Metal loss resulting from dirt abrasion, normal wear or acidic attack is minimized. Friction is also reduced.

Elaborating on one point, the acids normally created during engine operation may attack the bearings and crankshaft journals. A chromium-plated crankshaft will not eliminate the attack on the bearings but will prevent attack on the crankshaft which is by far the more costly item.

A little imagination will relate all of the qualities to engine operation and its problems. One word of caution, however. Chromium plating is not a panacea; there are some places where it does not fit. For example Lane rebuilds camshafts. While bearing journals are chromium plated and ground to standard, the lobes are built up by welding with a hard facing and then ground to the proper contour. They do not recommend chromium on the lobes because of the hammer-blow effect that they receive in service.

So much for the characteristics of chromium but what about. . . .

Plating Hard Chromium

Hard chromium plating is one of the most difficult and exacting plating processes known. To the plating engineer it can be both heartbreaking and gratifying; easy and difficult; predictable and unbelievable; feasible and impossible; discouraging and inspiring. It takes experience, a stout heart, good common sense and a good knowledge in several fields—geometry, electricity, chemistry, metallurgy, heat treating, machining including grinding plus a knowledge of welding, soldering and lead burning (used in anode construction).

A diesel engine crankshaft is one of the most trying objects to plate due to its design and shape. To the most experienced plater it is an ordeal; to a beginner, it's curtains. There are many exacting precautions that must be observed.

CHROMIUM

Check these special qualities and relate to your equipment, its operation, and repair.

1. Hardness—Chromium is the hardest of the commercially plated metals. In Mohs Scale it is next to the diamond in hardness. Chromium rates 9, the diamond 10. Chromium rates 66-70 Rockwell C or 1000-1050 Brinell.

2. Corrision Resistance—Chromium has great corrosion resistance, is practically non-corrodable. It is not affected by alkalies, organic acids or most inorganic acids. Few metals have this valuable asset.

3. Low Friction—Chromium has an extremely low coefficient of friction and therefore becomes invaluable for plating many moving parts subject to frictional wear. Its slickness along with its hardness prolongs service life from two to five times. With low friction and thus less heat, chromed surfaces are highly resistant to scuffing and galling. Also there is less power loss due to friction, a feature more pronounced in heavier engines and machinery.

4. Temperature Characteristics—Chromium's heat conductivity is its melting point of 3500°F. It resists oxidation up to 1150°F. A well-plated crankshaft journal will withstand heat sufficient to melt the mating bearing as might happen in the case of an oil line failure. Pounding of the bare steel as when a connecting rod bearing fails might destroy the chromium plate but even so it often prevents severe damage to the shafts' base metal.

5. Adaptability—Practically all metals can be chromium plated if properly prepared for the process, although practically all metals require a different process for chromium plating. Chromium can even be plated onto itself with good adherance; no other metal can be, except with very special processing, and then adherance is sometimes doubtful.

6. Tolerances—Where it is important that close tolerances be maintained and smoothly operating parts are necessary, nothing compares with chromium plate.

7. Surface Characteristics—Although hard chromium is dense, smooth and relatively frictionless, with a special after-plate process, it can be made into what is generally called porous or channel chromium. Either pits, channels or a combination of the two are opened in the plate, the extent of porosity being controlled. The purpose is to assist lubrication under marginal lubrication conditions such as occurs in engine cylinders. Despite the surface interruptions the surface is still chromium and greatly reduces friction between pistons and rings and the liner. Under proper conditions it produces the longest wearing surface on cylinder walls of anything yet devised.

The pregrind of a crankshaft if not correctly done can cause failure of a subsequent good chromium plate and destroy the shaft. Fillets are a most critical area and must be correctly handled in the pregrind as well as in the finish grinding. Careful magnafluxing and demagnetizing are important. Correct anode design is an important and costly engineering problem as it changes for each make and size of crankshaft. Lane uses special equipment and techniques for cleaning and preparing the metal surface to insure the best possible bond.

Finish grinding of the chromium is also important. The operator must be experienced, correct wheels used,

the proper coolant and plenty of it applied, and ample time must be taken.

The engineered application of chromium to the crankshaft constitutes the major accomplishment of the whole process. All other jobs contribute to its success. The results of this plating depends greatly on experience and the achieving of a successful job separates the "men" from the "boys". Having touched on several important aspects, one remaining for discussion is. . . .

Heat Treating

Early in his many years of chromium work with industry, the Navy and the Air Forces, Mr. Lane learned the value and necessity of proper heat treating or heat-soaking. It must be applied to all diesel crankshaft work. An important step is to stress-relieve shafts before pre-grinding and they also have a special heat-treat prior to pregrind for shafts that are excessively hardened.

Now, all of these procedural steps require special facilities. Let's see what Lane has by way of. . . .

Equipment

The present plant, built of steel and concrete and located on a 5-acre tract, has 20,000 sq ft of floor space. It is arranged for convenient materials handling with large electric cranes throughout the plant. Plus normal electrical requirements, it has facilities to provide more than 32,000 amperes for plating.

There are nine chromium tanks, seven being horizontal and ranging up to 22-ft long. Two are deep wells, one 12-ft and one 24-ft deep, both with a 34-in ID. The plating department has its special cleaning equipment, plating fixtures and jigs pertinent to their special type of plating.

The magnetic inspection department is equipped with a large magnafluxing machine that reveals the deep as well as the surface cracks. The demagnetizing machine is large and of the better type.

The heat treating department consists of one small and two large ovens, all electrically controlled. The largest oven for crankshafts will accommodate a shaft 18½-ft long. In addition to the electrical temperature control, it has provisions for air circulation and temperature recording.

The grinding department has six grinders, three lathes, polishing machines and the various associated equipment. An internal grinder does cylinder work, there is one camshaft grinder, a full universal grinder for aircraft crankshafts and propeller shafts, and three crankshaft grinders for diesel shafts.

Their large crankshaft grinder is a new type Van Norman machine designed specially for large diesel crankshafts. It is equipped with the recently patented overhead compensators to take the sag out of heavy shafts during grinding. Mr. Lane says that this enables them to grind to within 0.0005-in tolerances. It has a 36-in swing and can take shafts up to 15-ft length.

These are the "tools" used. We can get an idea of how they are used by. . . . .

Following a Shaft

Without going into every exact detail, some of which are proprietary techniques and processes, the following sequence of operations with brief comment will show the complex but orderly progress of a shaft through the shop.

1. *Crankshaft received, recorded, inspected and miked.*
2. *Shaft is thoroughly cleaned.*
3. *Magnafluxed to locate any condemning defects.*
4. *Carefully demagnetized.*
5. *Stress-relieved by heat treatment (special treatment if excessively hardened) for three hours.*
6. *Preground with special care, particularly at fillets.*
7. *Cleaned by a special technique.*
8. *Installed in special rotary fixture.*
9. *Anodes and shields, previously made, installed.*

Plating jig with special anodes and shields permits chromium plating with proper amperage applied to main and rod, journals, while a motor slowly rotates crankshaft.

Oven to relieve hydrogen embrittlement after plating. It is also used for heat-soaking before pre-grinding to stress-relieve crankshafts and reduce any excessive hardness.

10. *Chemically treated and thoroughly rinsed.*
11. *Chromic acid etched while rotating.*
12. *Chromium plated while rotating with proper amperage applied to main and rod journals (from 24 to 72 hr).*
13. *After plating, shaft is removed, rinsed, inspected, and heat-treated for 3-hr at controlled temperature to relieve hydrogen embrittlement.*
14. *After cooling to room temperature, shaft is finish-ground to close tolerances and polished.*
15. *Shaft is inspected, cleaned and magnafluxed.*
16. *Shaft is cleaned, oiled and shipped.*

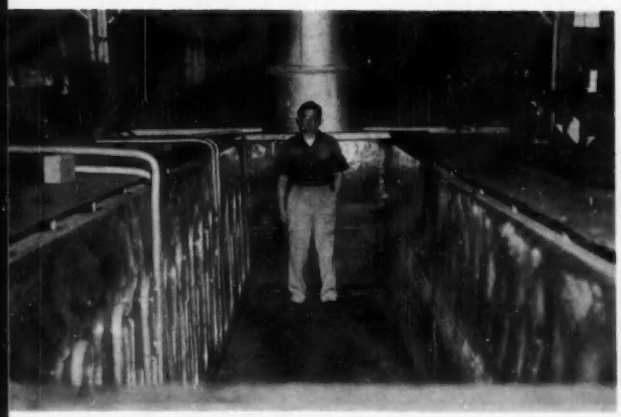
All of these steps are necessary and none can be slighted if a top quality job is to result. Mr. Lanes' experience has proved to him that there are no shortcuts. And now by way of . . .

Conclusion

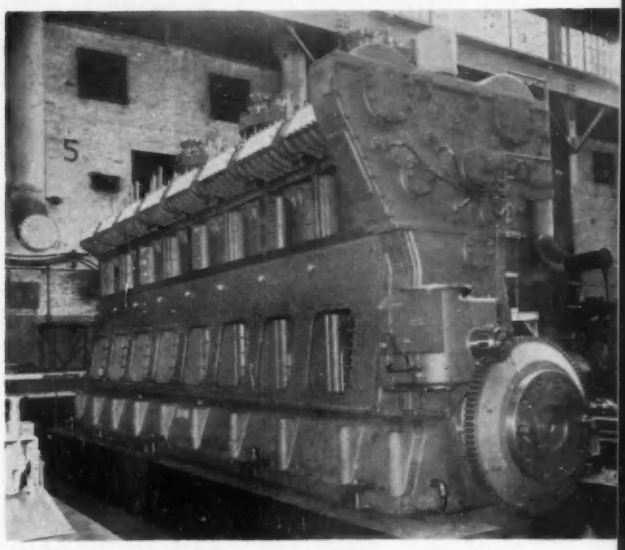
Mr. Lane is enthusiastic about chromium because he knows something of its great value to industry, having spent the greater part of his lifetime working with it. It gives him great personal satisfaction because he feels that it is an "engineered" plating and one difficult to master. In supplying information for this article he expressed his wish to protect the good name of chromium plating by setting up some sort of "yardstick" by which reputable chromium platers might be selected for this exacting job of plating expensive diesel crankshafts.

To owners of engines, Mr. Lane suggests the following for consideration—On your first engine overhaul, you may find your crankshaft journals worn sufficiently to require regrinding from 0.010-in to 0.020-in under standard. Then why not send it to a reputable plater, have it preground true, chromium plated and finish-ground back to standard?

By so doing you will not only eliminate the need for stocking different undersize bearings but will have a crankshaft that will probably outlast the engine.



Man in 22 ft.-plating tank gives indication of large size and construction of tank. Note heating elements on side of glass lined tanks to maintain correct plating temperature.



Second engine being dismantled for shipment after factory testing.

Natchitoches Doubles KW Capacity

POPULATION—9914, electric consumers—2824, total kw generated—4902. Up to June, 1955 these were the statistics on the city of Natchitoches, La., as reported in a recent power plant directory. To keep up with the growth of the first two items, the last statistic has just been bolstered by the addition of two more generating units to a total electric potential of 10,402 kw.

Baldwin-Lima-Hamilton won the engine contract, to install two identical Hamilton Model G-821-SA duel-fuels in a new extension of Natchitoches' present plant. They are 2-cycle, 8-cyl units rated 3870 bhp and producing 2750 kw each at 257 rpm. Electric Machinery supplied the synchronous generators and vee-belt driven exciters, as well as the motors that drive the American Blower scavenging air blowers.

Complete station piping, all concrete foundations, and new floors to go along with its engines were also part of Baldwin's contract. Here they were met by the problem of a low-load bearing soil consisting of sand and clay. Newly excavated areas adjacent to existing machinery and building foundations were rimmed by sheet piling to prevent cave-ins. And to give adequate support to each of the new engine-generator units and their concrete foundations, the soil was reinforced by creosoted wood piles about 20-ft long and 12-in nominal diameter.

Natchitoches now has firm capacity to meet present and foreseeable future needs.

Upper illustrations show cleaning steps—soaking and then brushing. Here, a good commercial solvent will do the job. As a substitute for the fiber brush, a hardwood block may be used as shown at lower left. Completely cleaned piston is seen lower right.

Cleaning Pistons

Caterpillar recommends the following procedure for cleaning pistons. Maximum ring side clearances are given for both diesels and starting engines.

DID you know that a piston in an 8-in stroke, 1000-rpm diesel engine moves against the cylinder liner a distance totaling more than 15 miles every hour of operation? In only 2000 hr of operation every piston in the engine has moved up and down in the liner a distance exceeding the circumference of the earth at the equator.

When such distances are considered, it seems only natural to expect some wear on pistons. Generally, piston wear is not concentrated at the points where most of the rubbing occurs. Rather, wear occurs in the ring grooves which never touch the liner.

Normally, the point of greatest wear on a piston is in the top ring groove. It is here that combustion pres-

MAXIMUM PERMISSIBLE PISTON RING SIDE CLEARANCE		
DIESEL ENGINE MODEL	CLEARANCE FOR DIESEL ENGINE	CLEARANCE FOR STARTING ENGINE
D397-D386	.014	.009
D375-D364	.014	.009
D17000	.012	.009
D13000-D8	.012	.009
D8800-D7	.012	.009
D337-D326-DW15-DW20-DW21	.014	.009
D318-D315-D311-D2-D4-D6-No. 6-DW10-No. 12-No. 112-No. 212	.010	.009

sures exert the most force on the ring, driving it tightly against the lower surface of the groove. High temperatures and minimum lubrication accelerating ring and groove wear, with the groove becoming progressively wider.

For this reason, all Caterpillar pistons now have cast-in iron bands to contain the top ring. The resulting lower wear rate in the top ring groove assures that, with proper cleaning and inspection, many pistons can be reused in an engine, even though the rings have worn out.

Although the skirt of the piston continually moves against the liner, skirt wear seldom becomes great enough to warrant piston replacement. The only cause of such wear would be dirt in the crankcase lubricating oil. Should excessive wear be found on piston skirts, it is a warning to thoroughly clean the crankcase and carefully check the oil filtering system as well as oil handling methods. The area above the top ring may be scored and still the piston may be perfectly satisfactory for further use. Most of the fine hairline cracks found in the craters of pistons are only surface cracks and in no way interfere with satisfactory operation of a diesel engine.

Of course, pistons may be damaged during removal from the engine unless care is exercised. During operation, cylinder liners wear, leaving a ridge at the upper limit of piston ring travel. Liner wear ridges should always be raised with a cylinder liner ridge boring tool before the pistons are removed. This tool raises the ridge above the travel of the top ring and chamfers it to a 45 deg angle.

Piston ring grooves are then safe from damage as the piston is pulled from the liner. As an additional safeguard to prevent ring groove damage, remove the carbon on the upper edge of the liner. This will prevent scuffing of the piston skirt and possible breakage of ring lands when the piston is removed.

Several good commercial carbon solvents are available which soften and remove carbon deposits on aluminum pistons. In many instances, the use of a solvent, plus a small amount of hand work to clean the ring grooves, will restore a "like new" appearance to pistons which have worked satisfactorily for many hours.

Cleaning ring grooves is a job that requires care. Use a fiber brush or piece of hard wood to remove carbon left in the grooves after the solvent has done its job. Never use a wire brush or broken piston ring to remove carbon from ring grooves. Such metal tools can easily scratch aluminum pistons, damaging the ring grooves and lands to such an extent that new rings will not function properly when they are installed.

Pistons which are not excessively worn or badly scored may be cleaned and used again, providing the ring grooves are square, undamaged and do not have excessive clearance between the new rings and the grooves. The permissible clearances between new rings and the ring grooves are shown in the accompanying chart. Long service life is "built into" pistons—it's just a matter of care to fully utilize all of that service life.

What Do You Know!

Here are some questions to test your general knowledge of the diesel field. Make your selections, then turn to Page 63 to check them.

1. When a mechanical clutch is used in conjunction with a torque converter it is often placed ahead rather than after the converter because:
   a. less vibration is transmitted to the load.
   b. a smaller clutch can be utilized.
   c. it makes for easier operation of the clutch.

2. A torque converter with a tailshaft governor connected to the engine throttle is ideal for applications which require—
   a. more power than the engine governor throttle is set for.
   b. disconnection of converter from engine due to overload.
   c. constant output speed for varying load conditions.

3. Normally, the point of greatest wear on a piston is in:
   a. the skirt.
   b. the ring grooves.
   c. the ring belt area.

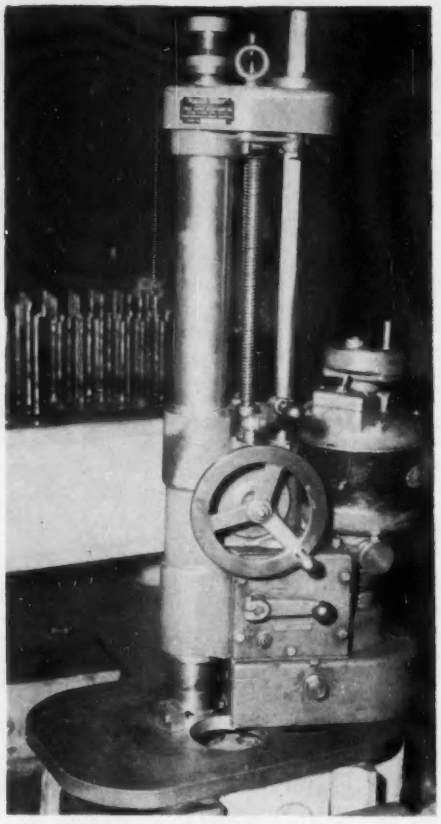
4. Chromium plating is recommended for the camshaft lobes as well as the journal bearings.
   a. True b. False

5. Crankshafts are usually chromium plated—
   a. when new to lengthen service life.
   b. to obtain better lubrication conditions.
   c. to reclaim crankshafts which are worn so that standard or standard undersized bearings may be used.

6. One result of excessive valve seat grinding is:
   a. loss of valve spring tension.
   b. less seating surface area.
   c. earlier opening of the valve.

7. If upon inspection, one or two exhaust valves showed signs of burning, the condition indicated would probably be—
   a. prolonged overload.
   b. late timing.
   c. excessive scale formation in a cylinder head jacket.

8. When installing a metal edge type strainer in a lube oil system which has a bypass filter arrangement, the strainer must be arranged for—
   a. full-flow cleaning.
   b. bypass cleaning.
   c. shunt cleaning.



Adaptor plate and automotive-type cylinder boring machine set up for counterboring valve seat insert relief in Alco Model 244 cylinder head.

Valve Seat Inserts Cut Reconditioning Costs

Several railroads are currently experimenting with valve seat inserts as a possible means of reducing valve seat repair costs.

GENERALLY speaking, more and more is being seen of valve seat inserts. This is true not only of original equipment but in reconditioning of equipment already in service. This method of repairs is being used experimentally but somewhat extensively, on several roads.

Initial test applications were made on Alco Model 244 heads. After these tests in actual service proved satisfactory, the procedure was extended to all heads of the same model requiring seat repairs. The practice was next employed on Alco Model 539 engines (12½x13), and it is also expected that Baldwin heads will be similarly reconditioned. Tooling on the Western road is for Alco 539 head repairs first.

Procedure

Before starting any reconditioning work, procedures of a well organized diesel repair shop start with a general examination. For example, while it may be evident that valve seat repairs are necessary, such work should not be started until it is certain that all other head defects are repairable. For example, a head might have a crack which cannot be welded.

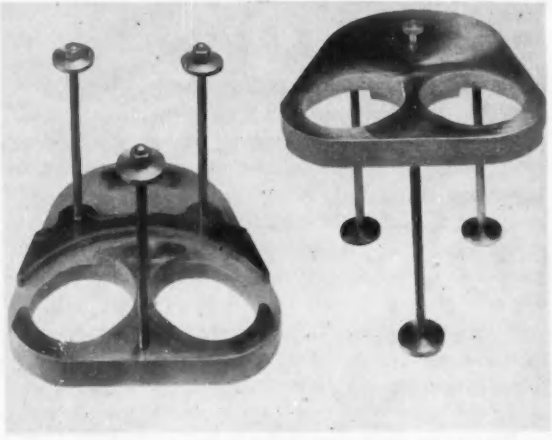
Disassembly is first. This can be an important step in the reconditioning process, as condition of parts in their original relationship may be noted. This may be important later. A preliminary inspection and thorough cleaning is essential. A close inspection of all parts should follow and include a hydraulic test on the head for possible cracks.

A quick check of available records and reports, should reveal whether the head is from an engine receiving just a routine overhaul, or if the engine has been giving trouble. In the latter case, a more thorough observation before, during, and after dismantling is in order.

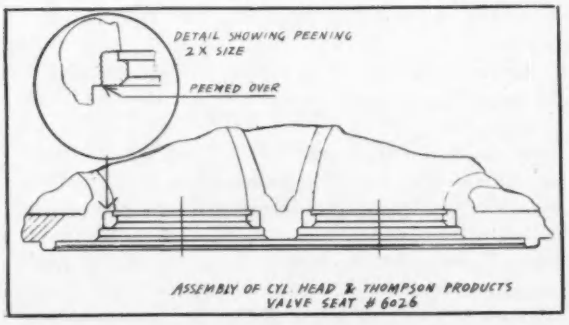
Examination will show whether conditions are general or local. For example, if all exhaust valves show signs of burning or cracking, a general heat condition is indicated, such as would be caused by a prolonged overload, late timing, poor cooling or some other condition existing over a comparatively long period. If only one or two exhaust valves show heating, some reason for poor local heat transfer is suspected, such as valve stem looseness or inadequate seating area. Sediment or scale in the water jackets may also be impeding heat transfer. Improper torquing of cylinder head nuts may result in pitted valve seat surfaces on one side due to distortion.

Whatever the cause of such conditions, and only a

Adaptor plate for counterboring Alco Model 244 cylinder head. Plate is centered with respect to counterbore and boring machine then centered with respect to plate.



Adaptor plate for counterboring Alco Model 539 cylinder heads. Oblong holes in the plate are necessary since intake valves are closer together. Exhaust valve seats are counterbored with one setting and intake valves with another setting.



Detail showing counterbored cylinder head with valve seat insert in place. Note that valve seat insert is peened in place after driving. *(Courtesy Southern Pacific Company)*

few examples are cited, a search for the cause should be made, and corrective action taken.

Valve seat defects may be due to excessive wear, distortion or cracks induced by thermal effects, pounding, erosion, etc.

A check to see whether grinding will restore a suitable seat surface is usually the first step. If this could not be done, the practice most generally followed, has been the rather time-consuming process of building up the seat by oxygen-acetylene welding using a molybdenum cast iron welding rod. This procedure generally results in warping of the head, which makes necessary the machining of all finished head surfaces. Building seats with electro-deposited iron has been done to some extent, but for this work it is necessary to send heads to a qualified concern.

Perhaps valve seat inserts may be the answer. They are a common and practical method of renewing the seat to its original height, so that the valve spring tension and other important design features of both valve and valve port can be fully utilized. Besides this the material in the new seat is such that functional action of valve and seat contributes greatly towards high engine efficiency and long service life.

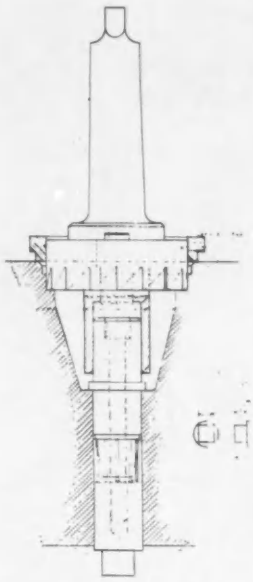
A few problems may arise in connection with their use unless care is taken. In-as-much as an interference fit is involved in most applications too tight a fit may lead to distortion and eventually to cracking of the insert and possibly the head. If fitted too loosely the seats may tend to work loose and possibly come out. Counterbore and insert ring sides must be parallel, and firmly in contact with each other around the entire circumference and depth of the bore. The insert must also be firmly seated in bottom of counterbore. These conditions are essential to give maximum heat transfer.

Counterboring Equipment

Two types of machine tool equipment have been found practical for cutting the counterbore in the head. Each seems to be capable of the accuracy necessary to insure coincidence of centerlines of recess for insert ring and of valve guide, as well as gauging depth of bore.

A *KWIK-WAY* Model FT cylinder boring machine, manufactured by Cedar Rapids Engineering Company, is used for this work in shop of an Eastern railroad. While this machine, with a capacity of 2.63-in to 5-9/32-in, is designed primarily for boring internal combustion cylinders within that diameter range, it makes an ideal valve seat counterboring tool on locomotive diesel engines.

Special boring plates are required. A plate for use on Alco 539 heads, is bolted to the head by three studs. One goes through the injection hole nozzle in center of head, while the other two extend through hold down bolt holes at either side of cooling water opening. You will note that the holes in the plate for the boring machine sleeve are oblong, and that the centerlines are not parallel. This is because the air intake valves are closer



Sketch of the counterboring cutter and guide designed by the Southern Pacific Company. Three cutters do the job in a radial drill—one each for the relief pocket, 45 deg bevel, and valve seat insert. All cutters are interchangeable on this assembly.

together than the exhaust valves. One setting of the boring plate permits boring both intake valve seats, while both exhaust valve seats are bored with another setting of the plate.

The boring machine is placed on plate and slid over the anchor bolt (shown) in the approximate center of plate. Machine is then centered in the 3-5/8-in diameter port immediately below the valve seat, and it is clamped to plate.

After adjusting the cutting tool in the boring head, the adjustable depth gage is set to suit the insert ring being used. The boring sleeve is then carefully and slowly fed downward either by hand or by power feed (if a speed reducer is used in conjunction with boring machine), and this considerably speeds up the operation and lessens the time of counterboring operation. When using power feed, it is released before the cutting tool reaches bottom and hand fed for rest of cut—care being taken each time to clean up the bottom of counterbore. The depth gage of course limits the depth of cut.

Three roughing cuts of 0.050-in are taken, each cut increasing diameter 0.100-in. Then the cuts are reduced to about 0.025-in, each enlarging diameter 0.050-in, with finishing cuts ranging from 0.001-in to 0.002-in, each taking only 0.002-in to 0.004-in out of diameter. To the old railroad shop man these seem like extremely light cuts, but experience in boring automotive-type cylinders has shown that a better finish is obtained on sides of counterbore, and more accurate size control (important here) is likely to be obtained with these cuts.

Design of plate for Alco Model 244 heads is different. Note that this plate has two "T"-head anchor bolts around which machine is guided in placing for seat to be counterbored. Machining procedures and application of seat inserts are about the same as outlined above for Model 539 heads. However it is necessary in this case to center the boring plate with relation to the counterbore to be made, and then to center the cylinder boring machine with relation to the boring plate.

On one western road, counterboring is done on a radial drill, with special milling cutters. It will be noted from the assembly drawing that the cutter is centered by a special guide, securely held by an expanding mandrel, in the valve stem guide. An adjustable ring for depth of cut is used for the valve seat recess, and another for machining the relief pocket. Note that insert ring is shown flush with bottom of relief pocket in head, and that a note calls for peening over at this point.

In all cases counterbores must be machined into the head so that the centerline of each coincides with the axis of the valve. Counterbore dimensions must be exact as to depth, diameter, with sides straight (vertically), smooth, and parallel to valve guide centerline. The bottom must be flat and smooth with no ridges or burrs.

The Thompson Products insert used on Alco 539 heads is 4.378-in OD. Counterbore diameter is machined to 0.003-in less than insert ring OD, with both at the same room temperature. Therefore counterbore diameter in the head is 4.375-in.

Installation

Application procedure usually calls for shrinking insert rings by placing them in a container of dry ice for a short period of time. Another method of shrinking inserts is to place them in a cardboard or wooden container and cover rings with carbon dioxide snow, such as obtained by expanding carbon dioxide gas from a fire extinguisher to atmospheric pressure. Still another method of application reported is to expand the counterbores by placing cylinder head in hot water.

When after making a last minute inspection to make sure that there is no dirt cast iron dust, cuttings or other foreign material in the counterbore, the insert may be applied. For this operation a driver with two diameters is needed—one about 4.350-in to 4.30-in, the other slightly less than the 3⅝-in ID of insert ring, to center the driver in the ring. If the insert is placed in the counterbore promptly upon removal from the cooling medium, it will drive easily with use of a 2- or 3-lb hammer. After ring has been applied and temperatures equalized, metal around edge of counterbore is lightly peened.

Extreme caution must be exercised in placing the ring in the recess, to make certain it is not cocked or does not become so during driving. Any tendency of the ring to shear or broach metal from sides of the bore must be avoided. Any such action will cause metal particles either to wedge at sides cocking ring, or to carry particles down under ring preventing it from seating evenly and completely on the bottom. Such a condition would cause trouble, even if valve seat is ground to fit valve. The imperfect fit at sides and bottom of counterbore would greatly affect heat transfer, and likely the insert would become loose sooner or later and come out.

Straight from the Tool Box

This is YOUR Department. Pass along your ideas to the other fellow. Send items to the Editor, preferably with a picture or sketch. Contributors will receive $10.00 for each item upon publication.

Stuck Injector Needle Remedy

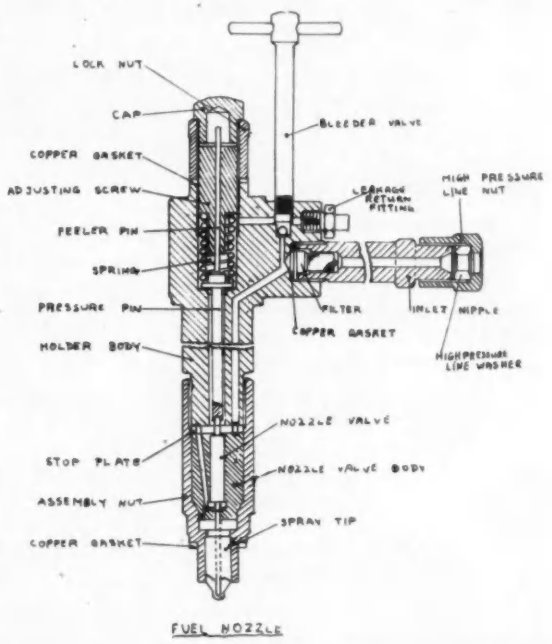
BOB WANG, KEELUNG, TAIWAN—Many diesel operators, especially engineers aboard motor vessels, have been found with a variety of injector troubles. Among these is the case of stuck needle valves.

On the Bendix-Scintilla nozzles for example, I have found that the easiest method of removing stuck needles is by the use of hydraulic pressure. This is possible on the Bendix nozzles because the needle is contained in a separate body rather than directly in the tip as in some other designs.

This can be done with the use of a nozzle tester and two spacers. One spacer can easily be made from a discarded stop plate by simply enlarging the center hole so the needle will pass through it. The second spacer is nothing more than a disc made of brass or some other material which will withstand high pressure. This is made to the same diameter as the top of the injector tip and is used to blank off the opening at the lower end of the nozzle valve body.

With these parts made, reassemble the injector, leaving out the pressure pin and spring and also the adjusting screw. When pressure is applied the needle will be forced out of the nozzle valve and into the spring chamber. It is necessary to replace the cap before pressure is applied.

Once the needle is removed from the nozzle valve, it may in most cases be reconditioned by the usual procedure of cleaning and/or light lapping.



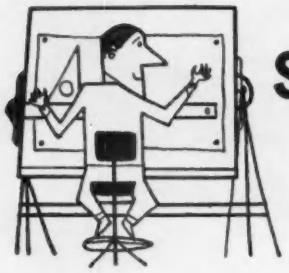
FUEL NOZZLE

Mr. Wang has developed a practical procedure on his own. However, Bendix recommends the same thing (see DIESEL POWER, *April* 1955). *We repeat this idea for emphasis and in case you missed it earlier—Ed.*

Extending Piston Pin Life

TOM MOORE, LOWELL, MICHIGAN—Diesel engine piston pins can be hard chrome plated and used for an extended period. Before processing however, the old pins should be carefully examined (even magnafluxed) for cracks. If okay, they should be ground just enough to true them. Chrome plating can be applied easily up to 0.125-in but no more than necessary should be plated. A plate of from 0.010-in to 0.020-in is usually sufficient and is better than thicker plating. After plating, the pin should be ground to the proper finish and size.

We have found that pins treated in such a manner wear much less and do not wear to a washboard surface as was the case with the old pins. This is an inexpensive way to recondition a pin. For example, on a 19½-in by 27-in 2-cycle Busch-Sulzer engine, several piston pins were reconditioned this way for a total cost of $43.75 each. These pins were 8½-in dia. by 12-in long and weighed about 160 lb.



service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you

CUMMINS—Adjusting Injector Plungers. . .

Injector plungers of all engines are to be adjusted with a torque wrench to a definite setting.

1. Adjust injector plungers and valves in "valve-set" position for the cylinder being adjusted as detailed in the engine manual. Always adjust the injector plunger before the valves.

2. Check threads on injector adjusting screw and nut to see that they are clean, well-oiled, and free-turning.

3. With engine in "valve-set" position for injector being adjusted, turn injector adjusting screw down until the plunger contacts the cup, and advance an additional 15 deg to squeeze oil out of cup.

4. Loosen the adjusting screw one turn.

5. Use a torque screw driver or a small, accurately calibrated torque wrench to tighten the adjusting screw to the required torque as given in the accompanying table.

Notes:

1. If a torque wrench is used, it should be equipped with a screw driver adapter and it should read in one ft-lb or in-lb divisions. It should have a maximum capacity of no more than 15 ft lb.

2. A bar, screw driver, or any other type of hold-down tool is not to be used when adjusting injector rocker levers by the torque method. To do so would result in a false setting.

3. Template marks and adjusting clips are to be disregarded when using the torque method of injector adjustment.

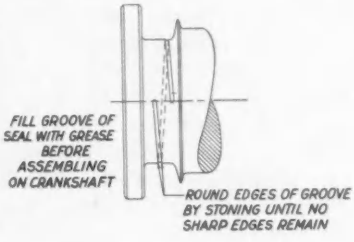
Table I
Torque Required to Adjust Injectors

Model	Cold	Warm
A and JS	4 ft lb	5 ft lb
H(S), HR(S), NH(S) NHRS, NHH(S), NVH(S), VT	5 ft lb	6 ft lb
L and LR	9 ft lb	11 ft lb

I-H—New Crankshaft Rear Oil Seals and Seal Retainers—14, 14A, 18, and 18A Series Diesels. . .

A split crankshaft rear oil seal of synthetic rubber and new grey iron oil seal retainers have been released, replacing the currently used felts and zinc die cast retainers on the 14A and 18A engines. Along with this change, the oil return groove on the crankshaft has been removed.

Note: Whenever service package 271 871 R91 or 271 872 R91 is furnished, the instructions show in the accompanying illustration should be applied to insure that the seal will have the proper after installation.


FILL GROOVE OF SEAL WITH GREASE BEFORE ASSEMBLING ON CRANKSHAFT
ROUND EDGES OF GROOVE BY STONING UNTIL NO SHARP EDGES REMAIN

GM—New Valve Guide Cleaners—Series "71" and "110" Engines. . .

New valve guide cleaners, tools J 5437 and J 5585 are now available for removing carbon deposits from the inside of valve guides on Series 71 and 110 engines. Tool J 5437 is designed for use on "71" engines and tool J 5585 for "110" engines.

These cleaners are of the brush type and are designed to clean the spiral grooves in the latest type valve guides, whereas the previous valve guide cleaners were intended to clean the former type of valve guides (Ungrooved). The valve guide cleaner consists of a handle and a replaceable brush; two extra brushes are included.

Orders should be directed to the Kent-Moore Organization, Inc., General Motors Building, Detroit 2, Mich.

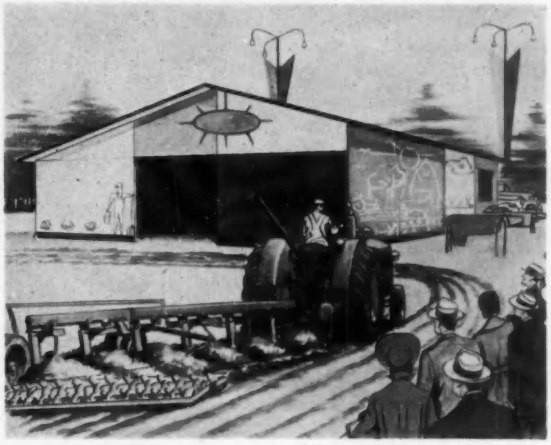
news of our industry

Plowing with Diesels

Within sight of Chicago's business district a single plot of ground will be plowed as many times in 26 days as it would ordinarily be plowed on a farm in 338 years. The demonstration will be part of an agricultural exhibit arranged by the Detroit Diesel Engine Div. of General Motors Corp. to show the important role diesel power is playing in this major section of the American economy. It will be a unique feature of GM's giant Powerama which is scheduled to be viewed by the public Aug. 31 through Sept. 25.

The plowing demonstration will take place 13 times a day for the duration of the show. After each demonstration, the ground will be recompacted to normal hardness and the normal moisture of the soil restored. As shown in the advance sketch, plowing will be done by a wheel tractor powered by a 3-cyl diesel engine pulling a 6-bottom, 16-in plow. Compacting will be accomplished by a sheep's foot tamper and roller.

In addition to these demonstrations, other Detroit Diesel farm displays will include a portable feed mill shown grinding feed for cattle and an irrigation system in actual operation. Division spokesmen have also announced that raw cotton will be transported to Chicago to be ginned and baled during the show, and that timber will be sawed into wood and rock crushed into road stone before the eyes of exhibition visitors.

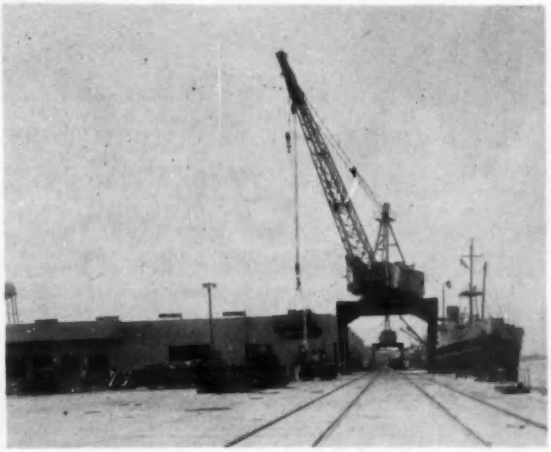


Diesels on the Wharf

Another accomplishment of diesel power is shown here at the Savannah State Docks of the Georgia Ports Authority. As the result of the addition of two gantry dock cranes, four medium-sized ships and one tanker can now be handled simultaneously at the southern port.

Representing the final step in completion of the port's facilities, the new cranes are designed to handle all heavy lifts and are claimed to be the only ones of their type south of Norfolk, Va. They are expected to bring in additional tonnage both in import and export shipments. Each is a Diamond Model DE120-30 with 35-ton capacity at 46-ft radius, powered by a Caterpillar D364 diesel-electric set producing 150 kw. A General Electric 30-hp gear motor and 90-hp crane motor, plus Gardner Denver air compressor, complete the installation. The cranes are self-propelled for operation along the concrete marginal wharf.

In addition to the two new cranes; the Savannah dock also boasts a 25-ton mobile crane and other modernized features such as shipside rail tracks, a 46-ft-wide apron, transit sheds with covered loading platforms for trucks and railroad cars, and 2 million sq ft of warehouse space. There is also a fumigating plant, cotton compress, industrial sites, and an export packaging service.



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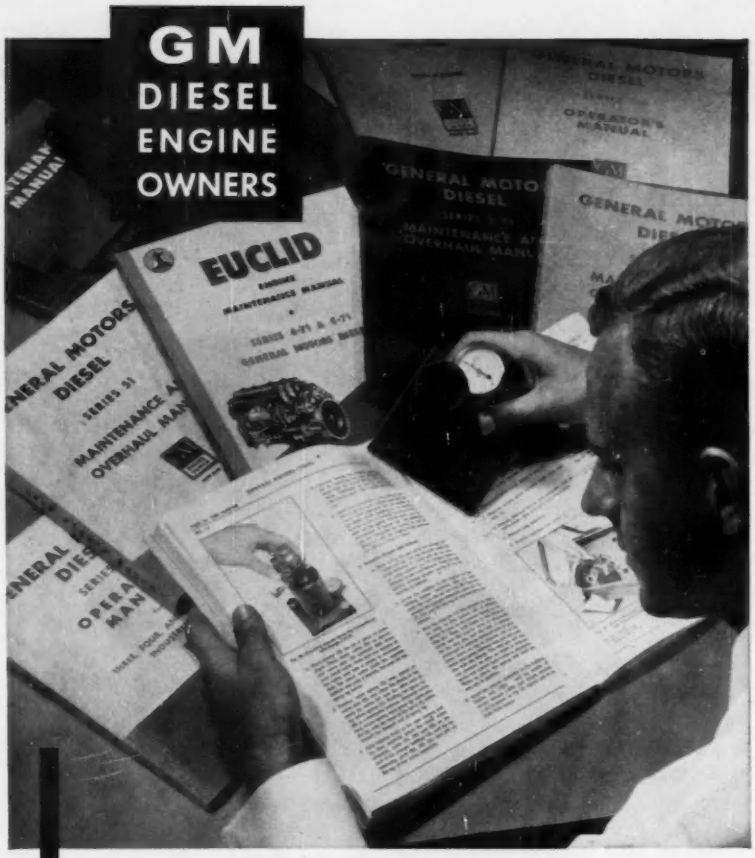

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ENGINEERS AND MANUFACTURERS OF SPECIAL AUTOMOTIVE SERVICE TOOLS AND EQUIPMENT

news of our industry

Utah Plant Adds Worthington

Worthington Corp. announces that the largest of its new SW 14 line, a 16-cyl Vee-unit will be installed in the municipal power plant in St. George, Utah. The engine, a high-pressure turbocharged 4-cycle, has a 4000-hp rating at 450 rpm.

The diesel plant at St. George first began operations in 1942 when two Worthington 4-cycle direct-injection diesels were installed. With increased demand, other Worthingtons were added. The SW 14 will be installed adjacent to the first two Worthingtons which have been operating on heavy wax distillate fuel since 1942. This premium cut fuel has a high pour point, the fuel congealing around 70°F, and must receive special handling. However, in certain sections of the country, the fuel is relatively cheap and burns well.

Cat Studies Distillates

Materials considered refinery by-products for many years are being used increasingly in producing standard diesel fuels, according to Caterpillar Tractor Co. Studies by its research department have indicated that if certain conditions are met, the "cracked distillates" or "recycle stocks" can be used in Cat diesel engines without harm.

The investigation began in 1939. Four problems are said to have been mastered in the lab. These concerned formation of gummy conditions in storage; flow and spray characteristics necessary for use in high-pressure diesel fuel injection systems; cetane numbers high enough to permit proper combustion; and, careful attention to lubricating oil and oil changes.

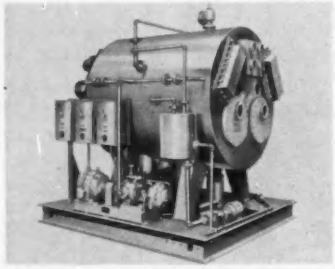
Caterpillar found that the fuel met required standards for its engines on all counts or could be bolstered easily with additives by the refiners. They say that advances in lube oils, which have been made to deal with sulphur in diesel fuel, make the use of cracked distillate fuel all the more practical.

news of our industry

Pure Water From Sea Water

An off-shore oil-drilling tender is producing pure, potable water from sea water at practically no operating cost. "Jack Cleverly", the tender, designed and built by Levingston Shipbuilding Co., Orange, Texas, uses waste heat from its mud pump diesel engines to produce distilled water for drinking, mud makeup, and other purposes.

Key to the operation is a new type of waste-heat evaporator developed by Cleaver-Brooks Co. In the pro-



cess, waste heat from the engines is transmitted through heat exchangers charged with sea water. The heated sea water is "flashed" into a vacuum chamber, and the resulting steam is then condensed on cooling coils as distilled water. The capacity of the installation, first to be built by Cleaver-Brooks for this type of application, is 300 gph. Similar units are now being built for larger capacities.

The company envisions many possibilities for this new type of evaporator in oilfield and marine applications. Because it requires no source of heat other than engine jacket water heat which is normally wasted, it is particularly economical and efficient.

I-H Ups UD-264 Power Capacity

Power and speed have been increased in its UD-264, 4-cyl diesel power unit, International Harvester Co. announces. The unit is now in production at 55 net hp at 1800 rpm. Previously, operation above 1600 rpm was available only with engineering approval. At 1600 rpm the unit develops 52 hp.

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The Efficiency of Luber-finer's Exclusive Patented Process HAS NEVER BEEN EQUALLED!

Only a Luber-finer Unit Plus a Genuine Luber-finer Pack can give the Exclusive Patented Filtering Process that has made Luber-finer The Standard Of The Industry Since 1936!!

THERE'S A LUBER-FINER MODEL FOR EVERY TYPE OF ENGINE...EVERY TYPE OF OIL!!

LUBER-FINER PACKS AVAILABLE

1. *REFINING PACK*—Introduced to the public in 1935 for use with straight mineral oils, fuel oils, hydraulic oils, and inhibited industrial oils.

2. *DIESELPAK*—First made available in 1941, the DIESELPAK was primarily designed for use with H.D. detergent compounded oils and has also achieved outstanding results when used with fuel oils and straight mineral oils.

DON'T BE MISLED BY PRICE ALONE!

There is NO substitute for DIESELPAK'S Patented Filtering Process for H.D. Compounded oils AT ANY PRICE!

The DIESELPAK cleans more oil faster—keeps it CLEAN longer—and gives more service and better engineered protection than ANY of the substitute filtering elements being offered for Luber-finer units.

IT PAYS TO GET THE BEST!

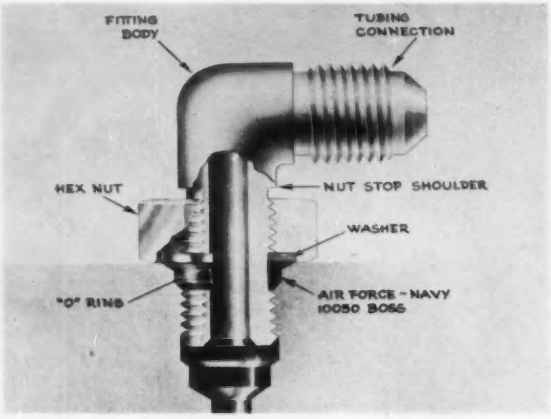
STANDARD OF THE INDUSTRY SINCE 1936

Luber-finer Units are Standard and Optional Equipment on America's Leading Diesel Trucks, Tractors, Stationary Engines

WRITE FOR COMPLETE INFORMATION TO DEPT. 7

LUBER-FINER, INC., 2514 S. Grand Ave., Los Angeles 7

new products



Leak-Proof Fitting

Leakage and directionalizing problems are claimed solved with this "Ring Seal" hydraulic fitting developed by Monarch Machine Tool Co., Sidney, O. Perfect sealing, even in repeated use, is said assured by its 0-ring and boss combination. Requiring about the same installation space as previous designs, the fitting needs no special installation tools and defective or worn threads have no influence on its sealing efficiency.

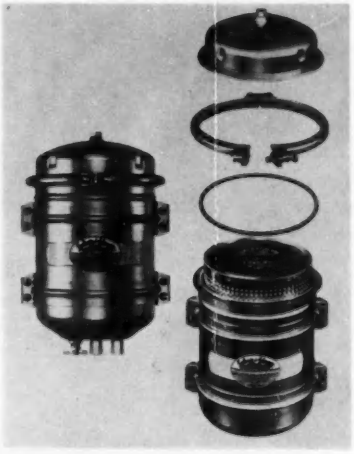
Each fitting, either in straight or angular form, has a standard JIC 37-deg flare end for connection. Upper and lower straight threads are at the fitting end opposite the flare, with a hex nut turning on the upper threads. 0-ring and washer are between the two thread sets, a special stop shoulder limiting their upward travel.

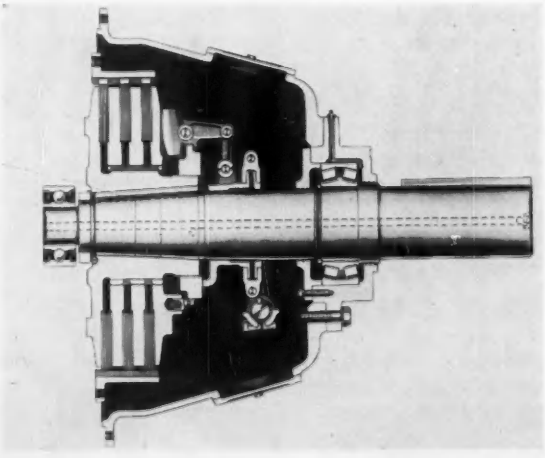
Engine Lube Oil Filter

Prompted by the success of its Models 500-C and 750-C filter units, introduced last year for engines with up to 5-gal and 8-gal crankcase capacity, respectively, Luber-finer, Inc. has added a new filter unit to its line. Developed for mobile, stationary, and marine engines with up to 3-gal crankcase capacity, the new Model 272-C is smaller, lighter, and easier to mount in limited space than the other two series units.

With its single-bolt closure, this latest unit offers the same simplified pack replacement as the others. It also incorporates an 0-ring type gasket for leak-proof lid closure at all operating pressures and a one-piece extruded steel housing and rugged mounting bracket design.

The 272-C also features the screw-type Luber-finer pack which, the manufacturer claims, assures a positive pack seal and elimination of the possibility of oil ever bypassing the pack. Further details are available from the company at 2514 S. Grand Ave., Los Angeles 7, Cal.





Heavy-Duty Power Takeoff

Forerunner of a complete line of friction power takeoffs being developed by Twin Disc Clutch Co., Racine, Wis., to meet extra requirements of highter hp and rpm engines, is this SP-318 for 350- to 375-hp class engines operating up to 1800 rpm. It accommodates an SAE No. 0 flywheel and has triple drive plate construction for ample friction area to withstand excessive heat.

The pilot bearing is made up of a single row of balls operating in bearing races of double-row width to accommodate minor misalignment and give additional space for lubricant. The clutch shaft has also been drilled for relubrication of the pilot bearing. Another feature is use of spherical bearings which permit angularity and are claimed more resistant to overload or destructive forces from heavy slide loads. The oversize shaft and counterbalanced engaging linkage are other features.

Engine PROTECTION

WITH

Synchro-Start

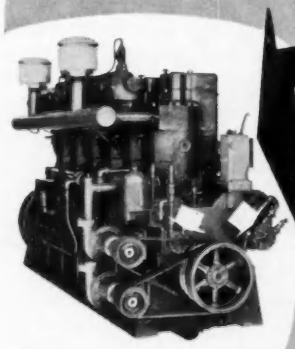
SAFETY ALARMS

Synchro-Start SAFETY ALARM SETS automatically warn with visual and audible signals as soon as such conditions as low oil pressure, low air pressure and overheating, etc. occur.

Three switches are provided—control "on-off"—test—audible alarm cut-off. For added protection these alarm sets may be equipped with automatic shut-down in case signals are not heeded.

Further information upon request.

SYNCHRO-START PRODUCTS
INCORPORATED
8151 N. RIDGEWAY AVE. • SKOKIE, ILL.



For POSITIVE LUBRICATION

It Pays to Specify

TUTHILL PUMPS

For dependable lubrication of diesel engines and power units, Tuthill offers a complete line of positive displacement pumps, designed for lubricating and scavenging. Included are automatic reversing pumps and stripped models for built-in applications.

Write for the Tuthill Pump Guide listing all Tuthill Pumps for lubricating requirements. Send specifications for quotation.

TUTHILL PUMPS FOR THE PURPOSE

TUTHILL PUMP COMPANY
Dependable Rotary Pumps since 1927
939 East 95th Street, Chicago 19, Ill.

Canadian Affiliate: Ingersoll Machine & Tool Company, Ltd., Ingersoll, Ontario, Canada

it pays to know the EXACT RPM of your DIESEL ENGINE!

Get maximum efficiency
longer engine life

for BUSES • TRACTORS
TRUCKS • BOATS

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NO DRIVE CABLES

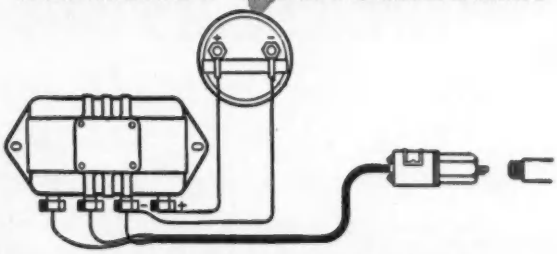
6, 12, or 24 VOLT
ILLUMINATION

SELF-POWERED
NO BATTERY DRAIN

HIGHEST ACCURACY
LONGEST SERVICE LIFE

RUGGED, DEPENDABLE
EASY TO READ

with new *Sun*
MECHANICAL DRIVE
ELECTRIC TACHOMETER!



Now, New Sun Mechanical Drive Electric Tachometer for diesel engines gives consistent, more accurate RPM readings for greater diesel efficiency and economy!

Operation is simple and foolproof. The new Sun Power Units are available for standard S.A.E. drive ratios—and S.A.E. mechanical drive outlets. Troublesome, long drive shafts are eliminated. The Sun Transmitter Unit attaches to any S.A.E. mechanical drive outlet where electrical impulses are picked up and transmitted to the Power Unit and then relayed to the "Tach" head in terms of RPM.

YOU GET GREATER ECONOMY . . . HIGHEST ACCURACY—with SUN! "Tach" Head has illuminated dial with adjustable arrows to indicate safe, economical RPM range! Jeweled D'Arsonval movement, Alnico magnet and rugged double bridge construction gives accuracy to 2% of full scale AT ALL ENGINE SPEEDS!

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for greater GASOLINE ENGINE economy . . .

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SUN DRIVING GAGE

for passenger cars

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Tachometer Div.
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(GASOLINE ENGINE)
☐ SUN ELECTRIC TACHOMETER
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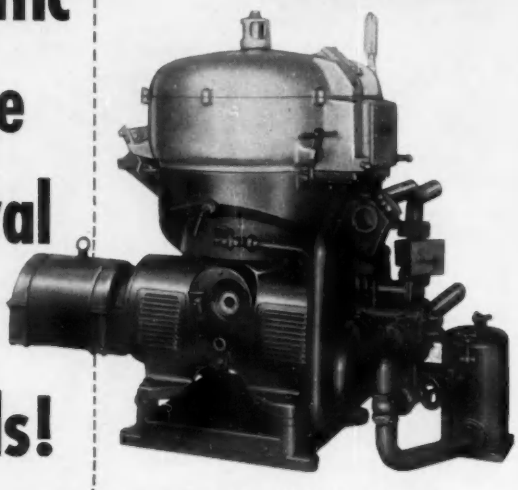
Automatic sludge removal in seconds!

WESTFALIA SEPARATOR



Westfalia Model SAOG-4016 Marine Type De-Sludger (self cleaning oil separator) with hinged, vapor-tight hood, equipped with built-on double gear pump, strainer, flow indicator, inspection-sample station.

Residual fuel-oil purification with the new Westfalia SAOG-4016

In purifying residual oils for use as diesel or turbine fuel, separators with self-cleaning bowls are superior to all other types of continuous centrifuges.

Westfalia Automatic De-Sludgers are the best because

- **Fully automatic operation — saves manpower**
- **Highest capacity and separating power — cleaner, drier fuel**
- **Superior bowl design — foolproof sludge discharge — uninterrupted service**
- **One-piece de-sludging cylinder — no valve mechanism fouling — solids pass freely — no nozzle plugging**
- **Bowl cover top locking ring — no sludge leakage**
- **Stainless steel construction in a compact, sturdy design**
- **Simple assembly and disassembly**

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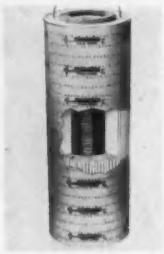
SOLE DISTRIBUTOR FOR WESTFALIA SEPARATOR A. G.

new products



Filter Cartridge

High flow rates at very low pressure drops are claimed with "Flo-Pac", a filter cartridge being introduced by Houdaille-Hershey of Indiana, Inc., Lebanon, Ind. The filter element consists of 44 sq ft of heavy, resin-impregnated, accordion-pleated paper formed around a perforated metal center tube and enclosed in a treated paper cover. It is said to have exceptional dirt-holding capacity due to its large area.

Flow rate is 25 gpm for 170 SUS oil with initial pressure drop of 1½ psi; 98% of all 20-micron and larger particles retained initially. Smaller particles are removed as accumulated solids increase efficiency. The cartridge is used to filter a wide range of liquids and fits all full-flow filters that accommodate standard Navy large filter cartridges. It will also withstand 100 psi to make it suitable for many bypass operations as well.

Completely inert, the filter will not remove additives, and is unaffected by water so that it may be used for water emulsion coolants and washing solutions. The complete cartridge is 18-in high and 6½-in diam. It weighs 4½ lb and has a bail for easy installation and removal. There is a cork gasket on each end for perfect seal even when cartridges are double-decked.

Angle Gauge Blocks

Production of a new set of angle gauge blocks has been announced by Webber Gage Co., 12912 Triskett Rd., Cleveland 11, Ohio. Certified accurate to ¼ sec, they are made of steel, each set containing 16 blocks. Size measures ¼-in thickness and 1¼-in diam.

new products

Portable Balancer

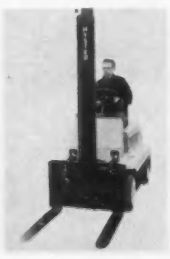
Tinius Olsen Testing Machine Co., Willow Grove, Pa., has a portable, self-contained balancer for any part which cannot be handled economically in a precision-type balancing machine. Useful for large parts, it provides vibration analysis as well.

The machine is capable of balancing at speeds of 250 rpm. The angular location and amount of correction weight required in two selected correction planes are done without guesswork. The unit is housed in a lightweight carrying case and consists of one inertia-type pick-up, a stroboscope light, an amplifier with range switch, and necessary cables.

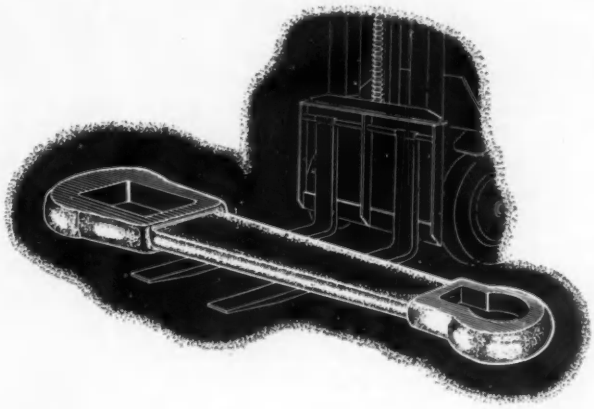
One-Mast Lift Truck

Panoramic visibility claimed never before possible with conventional upright assemblies is the feature of the Monomast, a one-mast fork lift now being exhibited at dealers of the Hyster Co., 2902 N.E. Clackamas St., Portland 8, Ore. The new unit allows an unobstructed operator view of both forks and load. Additional operating advantages claimed are faster maneuverability and approach, more accurate load placing, and safer load handling.

A 15% increase in hoist speed is declared; load raising speed is 58 fpm with corresponding increase in lowering speed. All standard hydraulic attachments can be mounted on the attachment carriage. Optional standard lift heights to 12 ft are available. The Monomast with capacity to 4000 lb has been designed for the company's UC-30 and YC-40 models which operate on gasoline, LPG, or diesel power.



Worn?
Mismachined?



VANDERLOY*
is the answer.

Connecting rods, power cylinders, shafts, rods—i.d. or o.d. surfaces—all can be restored to design dimensions by the application of VANDERLOY.

VANDERLOY* an electrolytic iron that bonds atomically with most ferrous metals, aluminum, copper, nickel and their alloys.

Write for additional information on this NEW reclamation service.
Dept. PR2 , VAN DER HORST CORPORATION, Olean, N. Y.

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TRADE MARK

TERRELL, TEXAS
OLEAN, NEW YORK
LOS ANGELES, CALIFORNIA**
HILVERSUM, HOLLAND

*Patents applied for

**SparTan Engineering
West Coast Licensee

new literature

Cylinder Liner Reclaiming

The Porus-Krome process, which involves the electrodeposition of chromium on the bores of cylinders, and its specific application to the power plant field, is described in a bulletin available from Van der Horst Corp., Olean, N. Y.

Profusely illustrated, the bulletin lists five principal advantages of replating a liner with Porus-Krome. These are: up to 50% increase in piston life; cylinder life 3 to 5 times above cast iron; reduction in lube oil consumption; reduced engine and compressor downtime; and elimination of need to stock oversized pistons and piston rings. A graph comparing lube oil consumption, life expectancy, and seating time of the chromium plate with cast iron completes the emphasis.

Honan-Crane Oil Filters

Three 8-page equipment bulletins have been issued by Houdaille-Hershey of Indiana, Inc., Lebanon, Ind., to give the story on its new line of Honan-Crane oil filters. In addition to engineering features, they cover specifications, applications, operation details, and filter media data.

Bulletin 101 describes the full-flow filter, a unit designed for inline installation offering flow rates up to 900 gpm, available in nine sizes. The multi-cartridge filter is the subject of Bulletin 201. A versatile unit, it allows for six different types of cartridge elements to be used interchangeably to get exact degree of filtration needed for oil or coolant. Bulletin 301 covers bulk-type filters which provide depth-type filtration and are used in applications where oil must be kept absolutely clean.

B-L-H Locomotives

Six of its standard diesel-electric locomotives are described in the latest bulletin of Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Tables of complete specifications for performance, weights, dimensions, fuel and other supply capacities, electric equipment, etc., and tractive effort curves are given for all six styles. The listed locomotives have a wide variety of assignments from general switching to high-speed mainline freight service. They range from 1200 to 1600 hp, all supercharged to maintain ratings up to 8000-ft altitude. Continuous tractive effort is from 46,000 to 79,500 lb.

Stainless Fasteners

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y., is offering a brochure listing its complete line of fasteners. Included are style and size data on screws, bolts, nuts, washers, and rivets. Available body and head styles are illustrated.

AMOT SAFETY CONTROL

AMOT Model 1476-47 automatically shuts down engine on high water temperature or low lube oil pressure. Features are:

1. **No capillary tube and bulb used.**
2. **Uses well known AMOT element.**
3. **Several temperature sensing units can be used with one control unit.**
4. **Will operate an air whistle.**
5. **Will operate a diaphragm gas valve for large gas engine shut down.**
6. **Will operate as a diesel fuel shut off valve.**
7. **Available with 2" direct connected gas valve.**

AMOT CONTROLS CORPORATION

RICHMOND 1, CALIFORNIA

DEPENDABLE ENGINES • ENTERPRISE

STATIONARY & MARINE

HEAVY DUTY POWER

Diesel • Dual Fuel • Tri-Fuel • Spark Ignited Gas

Units from 73 to 6933 HP
48 to 5007 KW

Over a million horsepower at work the world over!

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dependable **ENGINES**

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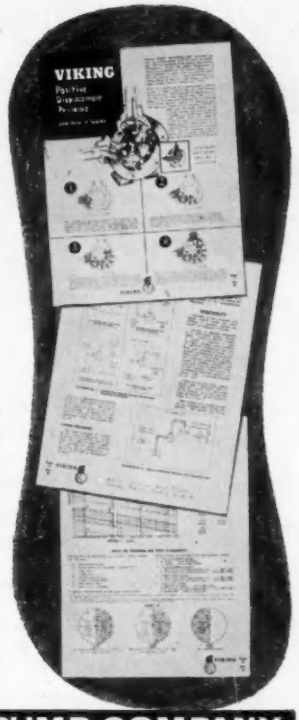
MORE HELP with your
PUMPING PROBLEMS

NEW 40 page VIKING Engineering Manual

A new 3-part, 40-page engineering manual including Viking rotary pump fundamentals, the 10 steps in selecting a Viking pump, and a special engineering section will help you in choosing the right rotary pump for your job.

This manual is free upon request. Write today for Manual K d.



VIKING PUMP COMPANY
Cedar Falls, Iowa
See our catalog in SWEETS

KIENE®
DIESEL
indicator valves

OPERATES AT PRESSURES UP TO 10,000 PSI

Kiene valves have effective gas seal both open and closed without packing or glands. Operate against pressure — will never blow open. Small and rugged — 4¼" in length with only 3¼" circle of space for attachment. Kiene valves give better service under the most severe conditions. Standard indicator plug and wing nut connection.

Furnished with male ½" NPT engine connection. Other threads on order. Adaptations for most diesel locomotive engines.

SEND FOR BULLETIN V-10

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

new literature

Quick Vehicle Washing

Twelve minutes is the average cleaning time required for a single bus or truck by means of a special lathery detergent. Oakite Products, Inc., 19 Rector St., New York 6, N. Y. makes this one-man cleaning method the subject of its latest brochure. The technique is based on use of the company's foam unit which consists of a 14-gal solution tank, a foam charging gun, and a 50-ft length of hose.

The lather is produced by filling the unit's solution tank with a combination of Oakite Composition No. 70 and compressed air. The detergent is applied directly to vehicle surfaces, brushed lightly, and then rinsed off with water. A series of step-by-step photographs demonstrates the technique for both a truck and bus. Also included is a diagrammatic illustration of the foam unit, together with explanations of its components.

Diesel Instruction Manual

Gray Marine Motor Co.'s new instruction manual and parts list for its Six-D427 is off the press and has been mailed to the company's distributors. The 272-page volume, a U.S. Navy Type C manual, offers complete teardown instructions and covers 11 Navy contracts.

Included also are all styles of transmissions which have been supplied with the engine and a section on the Bosch Model PSB single plunger injection pump which is now standard on the engine. Retailing at $8 per copy, subject to regular parts discount, the manual may also be obtained through the service parts department of the company at 710 Canton Ave., Detroit 7, Mich.

Engine-Gear Set for Pipelines

Nordberg Mfg. Co., Milwaukee 1, Wis., has released an 8-page booklet describing its Supairthermal engine-gear set for driving centrifugal compressors and high-speed pumps in gas pipe lines. Economy advantages of the company's spark-ignition gas engines are pointed out and details are given of the speed-increasing gear.

The Nordberg gear, capable of transmitting 4500 bhp continuously, is mounted on an extension of the engine bedplate to form a compact unit. The lubricating system of the gear is separate from the engine's. A performance chart is included for the engine and a cutaway view is given of the gear assembly.

Standardized Stud Welding

Twelve of the most commonly used arc welding stud, pin, and pad design specifications are included in a 16-page booklet offered by KSM Products, Inc., Merchantville 8, N. J. It reviews stud welding equipment and details the use of various studs. For ordering, drawings give engineering dimensions, minimums and maximums, and stud sizes. Material analysis, mechanical properties, thread sizes, plating, and annealing information is also supplied.

organizational news

Morse Sales Positions

Three sales changes have occurred at Morse Chain Co. Donald H. Spicer is the new sales vice president, Chester J. Spacher has been placed as sales manager of the chain drive department, and Robert J. Koch is now field sales manager.

Mr. Spicer was formerly sales vice president at American Bosch and prior to that president of World Bestos Corp. Mr. Spacher was lastly Morse's Ithaca district sales manager working out of Rochester. A Morse Chain employee for 28 years, Mr. Koch was previously Houston district sales manager. He will coordinate all field sales activities and will supervise distribution and new business development.

New Posts at Burgess-Manning

Burgess-Manning Co. has advanced H. A. Dietrich to manager of its Libertyville Div. and F. C. Duerr to district sales manager of its Midwest area. Both men were with the Libertyville Div. before their new appointments, Mr. Dietrich as sales manager, and Mr. Duerr as sales engineer.

H. A. Dietrich

F. C. Duerr

Socony Mobil Oil Elects

A new board chairman, a new president, and two new directors have been announced by Socony Mobil Oil Co., Inc. B. Brewster Jennings, president since 1944, is the new board chairman; Albert L. Nickerson, formerly vice president and foreign trade director, is now president; and Austin T. Foster and Paul V. Keyser, Jr. are directors.

Mr. Jennings will remain chief executive officer of the company. He has been a director since 1939. Mr. Nickerson first joined the company as a service station attendant in 1933. He took over foreign trade operations in 1951. Mr. Foster continues as general counsel. Mr. Keyser becomes foreign trade director.

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DROP FORGINGS

Weighing Up to 4,000 Lbs.

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DIESEL FUEL PUMP

Calibrating Stand

FOR TESTING

Bosch • Caterpillar • CAV

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All other Multi-Plunger and Distributer Type Pumps

- 3 Hp, 220 Volt Motor. Speed Range 150-4000 R.P.M.
- Vari-Speed Belt Drive featuring "step-less" speed change.
- Double-End Drive. Pumps may be driven from either left or right.
- Bank of 8 Graduates swivel-mounted for quick, convenient emptying by rotating lever.
- Push-Button Control automatically deflects fuel into graduates for preset number of revolutions.
- Fuel supplied from built-in reservoir by motor-driven pump. Two replaceable cartridge filters.

$1620.00

Pump mounting brackets, test nozzles, fuel lines, etc.—not included in above price—may be ordered individually or in complete sets to handle all makes of pumps or any particular line of pumps. Standard accessory sets priced as low as $270.00.

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Keeping Diesel Fuel Injection Pumps on the Road BUL. 697

BACHARACH INDUSTRIAL INSTRUMENT COMPANY
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☐ Send me FREE copy of your Service Manual Bul. 697
☐ Send me Product Bulletin 695 on the Fuel Pump Stand

NAME

COMPANY

STREET

CITY & STATE 6 CS-19

J. Rogers

J. W. Reed

Cooper-Bessemer Changes

Two changes have occurred at the Pacific Coast offices of Cooper-Bessemer Corp. James W. Reed, vice president of the company, has been named manager and John Rogers, who occupied that position for the past 15 years, has been appointed special representative and consultant.

Mr. Reed has been New York manager of compressor and stationary engine sales since 1940. He joined the company in 1922, opened C-B's first western office in Los Angeles in 1925, and remained there until he was transferred to New York. He became a vice president in 1947.

Mr. Rogers first started with the company in 1940 after 25 years of experience in the field of compressors and power engines. Under his guidance, West Coast activities expanded and offices opened in San Francisco and Seattle. His service to C-B will be national in scope in his new position, though he will continue to live in the West.

EMD Switches Two

E. W. Kettering has been assigned to the newly created post of research director at Electro-Motive Div., General Motors Corp. B. B. Brownell, former assistant chief engineer, has taken over Mr. Kettering's former post of chief engineer.

Mr. Kettering has been with GM since 1930 when he joined Winton Engine Co. (later Cleveland Diesel Engine Div.), and has been associated with diesel locomotive development projects since then. In 1936, he moved to Detroit to coordinate work on the 567 series. He went to EMD in 1938, was made senior project engineer in 1942, and assistant chief engineer in 1944. He became chief engineer in 1948.

Mr. Brownell started with the Delco Products Div. in 1935, transferring to EMD two years later as a junior electrical engineer. He was promoted to assistant electrical engineer in 1939 and became assistant staff engineer in 1942. In 1946 he took over direction of electrical apparatus on diesel locomotives as chief electrical engineer. He became assistant chief engineer of EMD in 1952.

E. W. Kettering

B. B. Brownell

J. L. Fuller

M. A. Young

Marquette Appointments

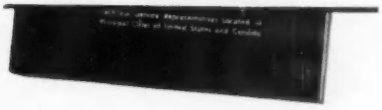
Merrill A. Young has joined The Marquette Metal Products Co. as works manager. For the past 1½ yr he has been engaged in private consulting and was with Clevite Corp. before that.

John L. Fuller, another new face at the company, has been placed in the newly created position of engineering director in charge of all product engineering and quality control. He was last with Reliance Electric & Engineering Co.

Caterpillar in Australia

Caterpillar Tractor Co. announces it has formed a third foreign company, Australia Pty. Ltd., to manufacture and sell many of its regular products as well as replacement parts for its entire line. Mark A. Clements, manager of the parts department of Caterpillar's Peoria plant since 1953, has been named managing director of the new subsidiary. J. Robert Hawk, Caterpillar representative in Australia, is the sales manager.

Your Guide To Diesel MAINTENANCE CLEANING



Here—in this new Power Plant Cleaning Guide—you will find one money-saving suggestion after another to help speed up your diesel overhauling and reconditioning work. Here, for example, are described the most modern, most effective procedures for:

- **Soaking hard carbon deposits off aluminum pistons**
- **Removing rust and scale from diesel cooling system**
- **Cleaning filters**
- **Desludging lube oil coolers**
- **Degreasing parts before repair**
- **Steam-detergent cleaning**
- **Stripping paint**

And saving time and money on many other important maintenance operations.

A FREE copy of this informative booklet will be mailed promptly on request. No obligation. Write Oakite Products, Inc., 22C Rector Street, New York 6, N. Y.

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MATERIALS • METHODS • SERVICE

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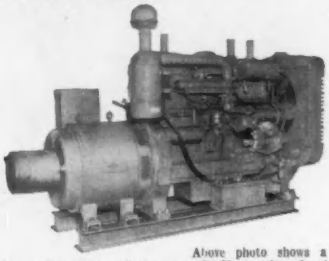
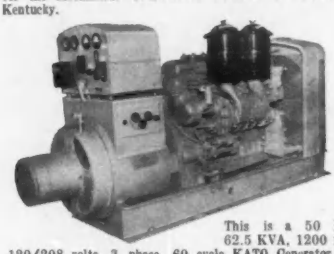
Continuous A.C. Standby Power

GENERATORS

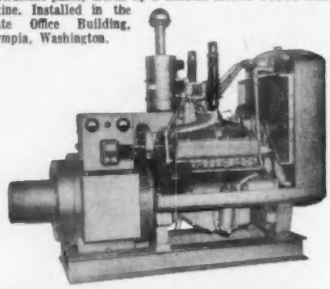
. . . a size and type to meet your needs to 400 kw



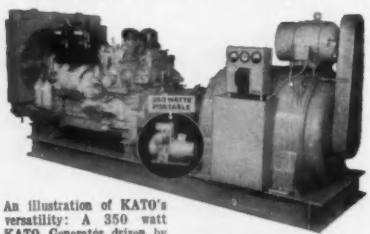
Above photo shows a 50 KW, 62.5 KVA, 1200 rpm, 120/208 volts, 3 phase, 60 cycle KATO Generators and instrument panel, driven by an International Model UD-18A diesel engine. Installed for the Mechanical Construction Division in Salt Lick, Kentucky.



This is a 50 KW, 62.5 KVA, 1200 rpm, 120/208 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by a General Motors 6030C diesel engine. Installed in the State Office Building, Olympia, Washington.



This pictures a 75 KW, 93.5 KVA, 1800 rpm, 240 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by an H-540 LeRoi engine utilizing natural gas for fuel. Installed for Republic Steel Corporation of Gary, Ind.



An illustration of KATO's versatility: A 350 watt KATO Generator driven by a Lauson LMH engine and a 150 KW, 187.5 KVA, 750 rpm, 120/208 volts, 3 phase, 25 cycle KATO Generator and instrument panel—driven by a General Motors twin 6-71 diesel engine. For Duluth, Mesabi & Iron Range Railway.

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organizational news

Diesel Energy Executives

In conjunction with the reorganization of its sales and service operations, Diesel Energy Corp., has elected Maximilian B. Bauer a director and appointed him vice president. At the same time, H. K. Breustedt was named vice president in charge of engineering. The company imports diesel engines from Kloeckner-Humboldt-Deutz, Ag, Germany.

Mr. Bauer, a native of Austria, who is now chief executive officer of the company, is also board chairman and president of Allied Tungsten Co., Inc., and U.S. representative of several foreign firms. Mr. Breustedt is a leading engineer of Deutz and has been delegated to Diesel Energy as special adviser on the imported air-cooled diesels which are now under active sales drive here.

M. B. Bauer

H. K. Breustedt

American Bosch Advancement

John H. Flaskamper, former manager of fuel injection sales, has moved into the post of vice president-sales at the American Bosch Div., American Bosch Arma Corp. He replaces Donald H. Spicer who resigned to join Morse Chain Co.

Mr. Flaskamper has been associated with Bosch for the past 12 years in various capacities including those of field engineer, assistant manager of manufacturer sales, and New York branch manager. He became fuel injection sales manager in 1953.

John H. Flaskamper

H. F. Vickers

K. R. Herman

Dr. N. Edlefsen

New Officers at Vickers

Recent elections at Vickers Inc. have resulted in three new officers for the company. Harry F. Vickers is now vice chairman of the board; Kenneth R. Herman has become president; and Dr. N. E. Edlefsen, vice president for engineering.

Mr. Vickers, founder of the company, is also president of the parent Sperry-Rand Corp. Mr. Herman, who joined Vickers in 1931, is a vice president of Sperry and a member of its board. He was previously vice president and general manager of Vickers. Dr. Edlefsen is new to the company. He was previously associated with North American Aviation, Inc., which he joined in 1947.

Houdaille-Hershey Addition

Charles J. Wallace has been elected vice president and general sales manager of Houdaille-Hershey of Indiana, Inc. With extensive experience in virtually every phase of the filtration industry, Mr. Wallace comes to his new post from the parent Houdaille-Hershey Corp.

The parent corporation has lately been in the news with its acquisition of Frontier Industries. Inc.

Charles J. Wallace

What Do You Know!

(*Answers to Questions on Page 45*)

1. Correct answer is "b". Clutch design is dependent on torque to be transmitted. If clutch is placed ahead of converter, only engine torque is handled. If placed after converter load-torque to maximum ratio must be handled. (See article on Page 26)

2. Correct answer is "c". With a tailshaft governor, a wide load range at controlled constant speed can be obtained. A tailshaft governor actuates the engine governor to control input power to converter to provide the exact torque needed at the set output speed shaft. (See article above)

3. Correct answer is "b". Rubbing of rings on lands under high downward pressure, pounding or flutter, all at limited lubrication and high temperature cause wear. (See article on Page 44)

4. Correct answer is "b". The lobes of the camshaft are built up by welding with a hard facing and then ground to the proper contour. Chromium hasn't stood up here. (See article on Page 40)

5. Correct answer is "c". Usually production crankshafts are not plated when new. They are chromium plated to reclaim them when worn. (See article on Page 40)

6. Correct answer is "a". Valve spring tension is weakened because the valve drops lower into seat and with respect to cylinder head. The use of valve inserts is one method of restoring original height. (See article on Page 46)

7. Correct answer is "c". Both "a" and "b" result in all exhaust valves being burned. A localized condition causes only one or two burned valves. (See above article).

8. Correct answer is "a". Strainers should always be arranged for full-flow cleaning. This affords some cleaning regardless of filter condition or hook-up and reduces dirt load to filter elements. (See article on Page 33).

Clean Oil

SAVES YOU MONEY!

HILCO

OIL MAINTENANCE EQUIPMENT

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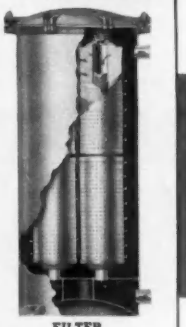


FILTER

Furnished in capacities from 0.1 to 750 gpm. Various cartridges available for mineral and inhibited detergent oils.

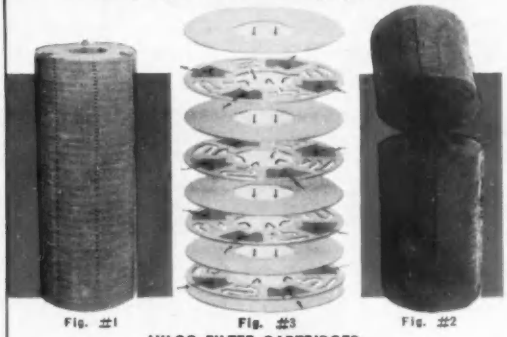


Fig. #1 Fig. #3 Fig. #2

HILCO FILTER CARTRIDGES

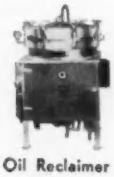
The result of much research in the field of lubricating, fuel and industrial oil filtration, the new patented HILCO Filter Cartridges meet the need for tremendous filtering area, low pressure drop and high dirt storage capacity. Above: Fig. 1 is a new cartridge; Fig. 2 is a used cartridge (note that pockets are completely filled and the outer surface covered with solids); Fig. 3 shows the flow of oil, the dark area represents dirty oil passing into the pockets while filtered oil (white area) passes into "S" shaped section.

HILCO Purification Means *Complete* Oil Purification . . .

You get absolute removal of sludge, acids, carbon, water and fuel dilution with a properly selected HILCO. Clean oil saves you money. Expensive maintenance is reduced, equipment shut-downs practically eliminated, lost man hours and cuts in production become a thing of the past. HILCO continuous, all electric, automatic purification keeps your oil clean and in top condition at all times. You receive the full capacity and economy of your equipment.

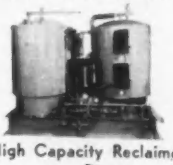
HILCO offers a wide range of oil purification units to meet every oil conditioning problem. HILCO units are manufactured in both stationary and portable models. Write us about your purification needs . . . recommendations are given with no obligation. Let HILCO put its 25 years of experience in oil purification to work for you.

THERE'S A HILCO FOR EVERY LUBRICATION AND FUEL OIL FILTERING PROBLEM



Oil Reclaimer

Purifier Re-Refiner



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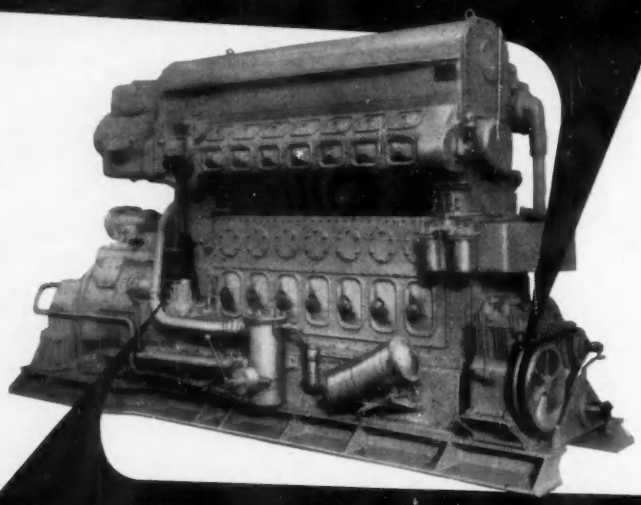
news of our industry

Gas Turbines in Oil Project

A large gas repressurizing plant being built on Lake Maracaibo, Venezuela, will have the most powerful concentration of gas turbines in the world, according to Westinghouse Electric Corp. Twelve 7000-hp combustion gas turbines with a total maximum rating of 96,000 hp will be installed in the plant's overwater platform. They will drive centrifugal compressors which will inject natural gas, derived from oil operations, into a 10,000-acre deposit extending beneath the lake.

Injection of the gas will maintain pressure on the oil pool to force the oil above the surface. The new plant will receive the gas from an 18-mi distance. The turbines will burn 26 million cu ft of the gas daily and will operate in two strings of six units each. Highly practical with the cheap fuel supply, shipment of the turbines is scheduled to begin in February, 1956.

Quincy FOR DEPENDABLE STARTING



on this FAIRBANKS MORSE DIESEL

Fairbanks Morse & Co. selected a Quincy Compressor to supply compressed air for starting this new apposed piston diesel. Like other leading diesel engine manufacturers, Fairbanks Morse used a Quincy because it gives long life and trouble-free service.

Specify a Quincy Compressor for your next diesel starting job. Compact, rugged Quincy Compressors will give you a dependable air supply.

There's a Quincy Compressor for every job. Let us help you select the right model from a variety of mountings and sizes from 1 to 90 C.F.M.

Write Dept. J-44, Quincy Compressor Co., Quincy, Illinois, for catalog on Quincy Compressors for diesel starting.

MAKERS OF THE WORLD'S FINEST AIR COMPRESSORS

QUINCY COMPRESSOR CO.
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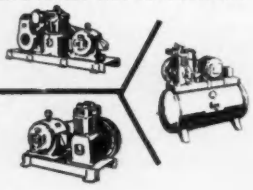

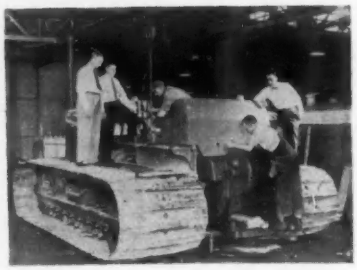

Tractors for the Antarctic

When Rear Admiral Byrd sets forth on his new expedition to the South Pole next November, he will be equipped with 24 track-type tractors to help establish three observation sites for scientific study. The tractors are being especially manufactured for the deep freeze climate by Caterpillar Tractor Co., which will also supply 16 electric sets.

Ten of the crawlers are modified 155-drawbar hp D8s with extra-long, extra-wide tracks. These will have 9-roller track frames, 54-in shoes, and 106-in gauge. They will have hydraulic dozers and towing winches, except for four which will be equipped with cranes. Nine other tractors will be D2s with 38 drawbar hp, three will be D4s with fork lifts, and two will be standard D8s.

The electric sets will consist of 13 D315s and three D342s. Self-regulating, the first units will deliver 30 kw and the latter, 100 kw.

The D8s will be used primarily in tractor trains, the D2s in construction of snow runways, and the D4s will load and unload aircraft. One of the D2s will be assigned to the weather station at the South Pole. Caterpillar is planning a training program for 15 Seabees who will learn to operate and service the equipment.

Stewart-Warner Buys Hobbs

Stewart-Warner Corp. has signed an agreement to purchase all the business and assets of John W. Hobbs Corp., producers of hour meters for maintenance of engines and other equipment. In announcing the acquisition, Bennett Archambault, president of Stewart-Warner, stated that John W. Hobbs will remain president of Hobbs and that no organization changes will be made.

news of our industry

Pan American Railway Congress

Buenos Aires will be the scene of the ninth Pan American Railway Congress, scheduled to be held the first two weeks of April 1956. Dr. Herbert Ashton, executive secretary, is inviting papers on any aspect of railroad operations from the 21 member countries of the congress. Papers from the U.S. are especially welcome.

Though papers may be on any subject, a list of suitable topics has been compiled which may be obtained by writing Dr. Ashton, c/o Dept. of Commerce, Room 7866, Washington 25, D. C. As at the last congress, held in the U.S. in 1953, money prizes for best papers in each section of the list of subjects will be awarded. They totaled $2500 in 1953.

1300-Yard Railroad Honored

The last remnants of the Marion River Carry Railroad, a locomotive and a passenger car, resting patiently in the deep woods of the Adironacks since 1929, are at last to be honored by posterity. They will be placed in the museum of the Adirondack Historical Assn. as exhibits of a fantastic period in American history. The trackage they ran over was only 1300-yd long, but the railroad was as complete as those existing today with timetables, waybills, and even annual passes.

The line was built in 1899 by William W. Durant when he could not persuade the New York Central to build a spur to the Blue Mt. Lake resort from its line 6-mi away. He planned to have a ferry meet the Central train at Raquette Lake, take on Pullman cars filled with passengers, ferry them across the lake, and up a river to the Carry railroad. There they would be pulled to the shores of another lake, and another ferry would carry them over to Blue Mt.

The only trouble was that Pullman would not go for the idea of floating its cars on the rocky streams. So Durant arranged the trip without the Pullman cars.

The whole train consisted of a locomotive and three cars. The surviving locomotive, a duplicate of the ones that used to pull the 'el trains of Manhattan, has a water tank above its boiler. Because of the short trip, it didn't need a coal car; a pile of coal was put beside the firebox before each trip. The three cars it pulled had once been metropolitan horsecars.

The railroad is said to have carried up to 10,000 passengers a year, plus freight shipments for the hotels. It ran three to four round trips daily, and could be chartered for $1 to carry canoeing parties between the lakes. Durant sent passes out, as was the custom, to the heads of all major railroad lines and received passes in turn.

After a few years, he went bankrupt, but purchasers of the property ran the line until 1929 when better highways put it out of business. Later, the rails were torn up for scrap and the train abandoned to the mercies of the woods. Now that a museum has been built, the faithful locomotive and its one remaining car will receive due honor as historical exhibits.

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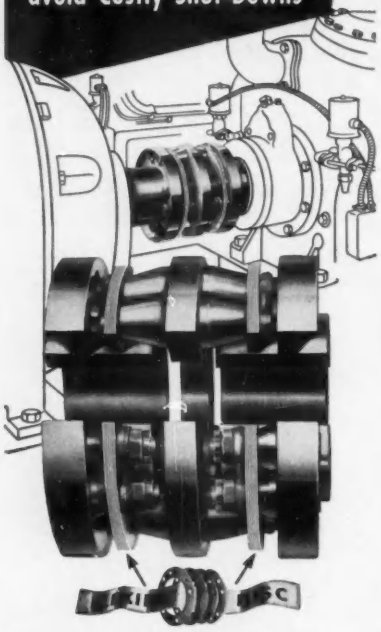
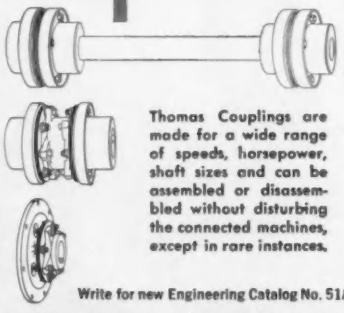
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



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news of our industry

New Haven To Order 60 Diesels

Directors' approval of an order for 60 diesel locomotives capable of operating in any part of the New Haven system, including the Park Ave. tunnel in New York City, is being sought. Specifications for the proposed new engines are being prepared. They will be all-purpose types for hauling freight or passenger trains.

The new engines will require special equipment in order to enter the city of New York in compliance with an ordinance, in force since 1907, which requires electrically operated locomotives.

It was also announced that three high-speed trains are being built for 2½-hr service between New York and Boston which will have many of the characteristics of the Talgo train manufactured by ACF Industries.

Yellow Transit Dieselizes

One of the Midwest's largest highway carriers, Yellow Transit Freight Lines, Inc., is re-equipping its fleet for diesel operation. It has just purchased 200 cab-beside-engine trucks from Kenworth Motor Truck Corp., powered by 6-cyl, turbocharged Cummins JT-600 engines.

In making the announcement, Kenworth disclosed that the trucks have been specially engineered with high hp to low weight ratio, suitable for Midwest terrain and length restrictions. Estimated tractor chassis weight is 8998 lb per unit. The 138-in tractor combines with a 35-ft van semi-trailer for an overall length of 45 ft and a gross combination rating of 60,000 lb.

Santa Fe Buys Toledo Rail

The Atchison, Topeka and Santa Fe Railway Co. announces that it has purchased 82% of the stock of the Toledo, Peoria and Western Railroad Co. TP&W, with headquarters in Peoria, operates from Lomax, Ill. and Keokuk, Iowa to Effner on the Illinois-Indiana line. The Lomax gateway has lately had an increasing flow of traffic.

4-Tractor Plow

Literally man-sized furrows are being cut by a plow on the Griset Bros. ranch in Del Mar, Cal. The plow, built back in the '30s by Post Bros. Mfg. Co. after flash floods had deposited barren sand atop fertile farm lands, was designed to penetrate 6-ft deep. However, back in those days five tractors couldn't pull the 23,000-lb plow so that it could cut depths below 3½ ft.

Today it is working at depths for which it has been designed, pulled by four crawlers totaling 540 drawbar hp. It plows about an acre an hour. The pace is as fast as a man can walk with the tractors running at full throttle in their lowest gear.

C-B Licenses Italian Firm

Termomeccanica Italiana of La Spezi, Italy has been granted a license to manufacture Cooper-Bessemer Type GMXA and GMVA Vee-angle engine-driven compressors and certain motor-driven compressors. This is the second compressor licensing agreement reached by Cooper-Bessemer Corp. with a foreign builder. A similar one was made with Harland and Wolff, Belfast, North Ireland.

Seaboard Orders EMD Diesels

Orders totaling $3,100,000 have been placed with the Electro-Motive Div. of General Motors Corp., Seaboard Air Line Railroad recently revealed.

Ten diesel-electric freight locomotives will be purchased and 12 others are scheduled to be rebuilt. The new locomotives will be 1750-hp road switchers, and power in those being rebuilt will be increased from 1350 to 1750 hp. Deliveries on both orders will begin in September to be completed in December.

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BIG NEWS

FOR ALL DIESELS!

FRAM completely removes water from diesel fuel with NEW WATER SEPARATOR & FUEL FILTER

✓100% Water Removal! ✓Traps Dirt and Dust!
✓Cuts injector maintenance costs!
✓Reduces down-time!

The new FRAM Water Separator & Fuel Filter is a double-action filter for complete injection system protection—

1. Saves costly injectors from corrosion, rusting and pitting . . . removes all water!
2. Micronic filtration traps dangerous dirt before it reaches injectors . . . ends abrasive action!

Save the cost of replacing expensive injectors! Guard your diesels for longer life . . . less wear . . . fewer repairs—with the new FRAM Water Separator & Fuel Filter! For specific installation information write: FRAM CORPORATION, Providence 16, R. I. Fram Canada Ltd., Stratford, Ont.

IMPORTANT!
Diesels already equipped with FRAM Fuel Filter need only the Water Separator Filter and a new FRAM Coalescer Cartridge for 100% water removal!

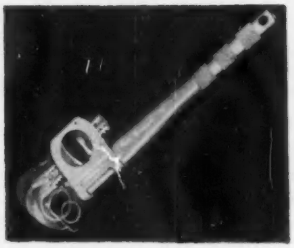
FRAM®
OIL • AIR • FUEL • WATER
FILTERS

new products

Pipe Wrench

Four features are emphasized for a new pipe wrench offered by Stilsomatic Sales Corp., 1100 20th St., N.W., Washington 6, D. C. These are: its tubular steel construction, automatic adjusting rocking fulcrum action, spring-loaded hook jaw, and light weight.

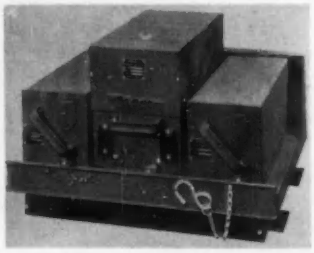
The wrench, called "Red Snapper", is unconditionally guaranteed against breakage. Its rocking fulcrum action is said to allow a number of different pipe fits with only one adjustment. For example, a 1½-in pipe setting will also accommodate 1¾-in or 2-in sizes. The fulcrum action also provides a snap-on feature. Once the jaws are placed on a pipe, the spring-loaded hook jaw exerts a constant pressure to hold the wrench in place, requiring only one hand for operation. It is now available in 12-, 14-, and 18-in sizes, with 24-, 36-, and 48-in sizes being planned.



Open Gear Lubricant

For application on highly loaded gears which can only be lubricated infrequently, The Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn., is making available Molykote 165X. It is a near-colloidal dispersion of its Molykote Microsize into tacky petroleum oil which has been rendered fluid by addition of volatile diluent.

Evaporation of the diluent is said to leave a plastic film that does not tend to hold dust, resists being washed off by water, and will not crack or peel at temperatures as low as 0°F.



Railroad Radio Power Supply

A new radio plug-in power supply, operating directly from the 64-v battery of the locomotive diesel engine without any accessory converter unit, has been announced by Motorola Inc., 4501 W. Augusta Blvd., Chicago 51, Ill. By incorporating two vibrators, one for normal operation and one on standby, with automatic changeover, this single unit is said to provide the same operation formerly obtained by using a separate converter with AC power supply.

Two magnetic circuit breakers protect each of the vibrators and eliminate need for external fuse boxes and fuses. Maximum tube life in the radio equipment is said insured by a special circuit which regulates filament voltages within plus or minus 5% of 6.3 v. Designed for use with the company's standard railroad receiver and transmitter, the unit is rated at 72 v input with allowable variations of plus or minus 15%. It is to be used with a new companion control head which has an indicator light to show when the auxiliary vibrator is in operation. Transmitters and receivers remain unchanged.

Tank-Type Carbon Remover

Multisol, developed by Brulin & Co., Inc., 2939 Columbia Ave., Indianapolis 7, Ind., is a 2-layer liquid for use in dip tanks. The upper layer is a floating seal said to reduce drag-out loss of material, prevent escape of solvent vapors, and to rinse parts as they are removed from the solvent. The lower layer is a combination of solvents, penetrating agents, and emulsifiers which break the bond between metal surfaces and carbon, paint, grease, and gums. The formulation is always used cold.

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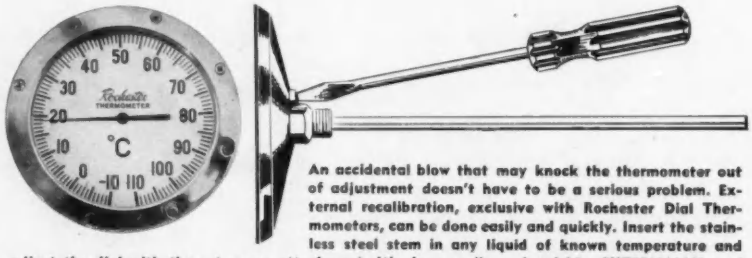

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new products

Combination Rule-Protractor

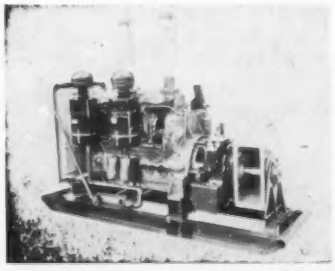
George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y., is marketing a jointed stainless steel 2-ft rule which also serves as a protractor. It measures longitudinal as well as angular dimensions without necessity of counting fine graduations.

The rule has an engraved scale of chords from 0 to 120, advancing by half degrees. It is also provided with center dots on each blade. By using a pair of dividers, the rule can be set to any desired angle, or vice versa, any angle can be determined. For example, to set an angle, dividers are adjusted to the line of chords. The rule is then opened until the divider points span the center dots. Spring tension holds the joint at rigid angle for scribing and layout work.

Torque Converter Power Units

Smooth, steady power over full speed range is said to be provided by the new line of diesel engine torque converter power units being produced by P&H Diesel Engine Div., Harnischfeger Corp., Crystal Lake, Ill. They have been built around the P&H 2-cycle diesel engines.

The torque converters are claimed to have unusual cushioning effects to eliminate shock load from driven equipment. An almost infinite range of speed is said obtainable. Complete with its own fluid cooler, each converter may be had with various types of clutch arrangements. A tailshaft governor is also available to control the output shaft speed. P&H offers the units on its complete line of diesels from 2 to 6 cyl, 30 to 255 hp.



Heavy-Equipment Cleaner

A 600-gph steam-cleaning and 500-gph high-pressure rinse machine employed exclusively by the Armed Forces for many years for heavy-duty cleaning purposes is now being made available commercially by The Clayton Mfg. Co., El Monte, Cal., builders of the machine.

The machine features four nozzles for the cleaning operation, the fourth nozzle used for rinsing. For those installations which do not require full 600-gph operation, the machine is so designed that it may operate at 400- or 200-gph with one or all four nozzles. Two models are available, one gas-fired and the other operating on oil. The oil unit may be mounted on a truck or trailer.

General Purpose Hose Clamp

Lasting and positive clamping action is said assured under extreme internal hose pressure, hose movement, and tough usage with a 1-piece clamp developed by Circle Clamp Corp., 39 Broadway, New York 6, N. Y. Offering savings on both clamping time and cost, it is round and has U-shaped folds or lugs.

The device is slipped on the hose or part and crimped in place by squeezing the parallel sides of the lugs together with ordinary pincers. Because the pressure of the pincers' jaws is approximately perpendicular to the surface of the parallel sides, there is said to be no danger of its slipping. To remove, the lugs are snipped off. Reported tests on 7/8-in wire-braided hose have shown no slippage or loss of clamping action at hose burst pressure up to 12,800 psi. Smaller size clamps have two lugs, larger ones, three.

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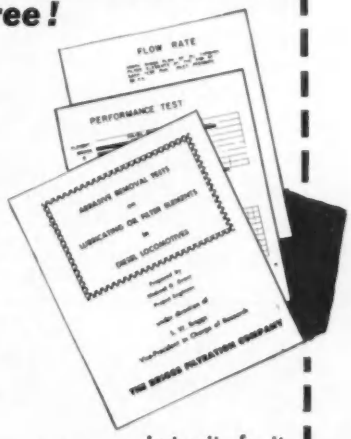

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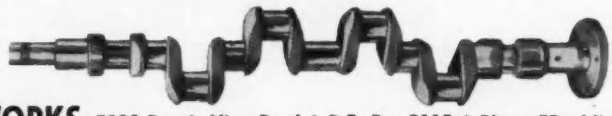

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new literature

Compressed Air Equipment

The first six pages of a bulletin issued by Sarco Co., Inc., Empire State Bldg., New York 1, N. Y., comprises a handbook with hookup sketches to help users of compressed air improve capacity of their installations. Descriptions are then given of cooling controls for compressor jackets, aftercoolers and intercoolers. Other data concerns drain traps, electric thermostats, and pressure switches.

Hose and Fittings Catalog

A composite industrial products catalog has been published by The Weatherhead Co., 300 E. 131 St., Cleveland 8, Ohio. In its 132 pages, arranged for quick reference, it includes sections on brass tube fittings, drain and shut-off cocks, bulk hose and reusable ends, and hose assemblies. Its technical data section contains pressure tables, tube bending instructions, hose assembly procedures, tubing safety factors, and tube wall thickness tables. Another section covers service tools and equipment.

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